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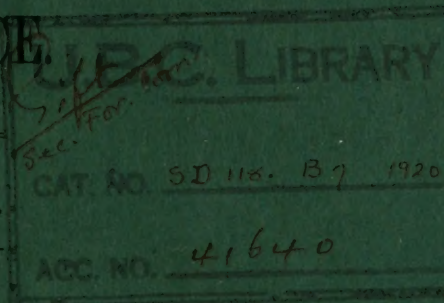
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FORESTRY COMMISSION, LONDON.

BRITISH EMPIRE FORESTRY
CONFERENCE

LONDON.

—1920.—



PROCEEDINGS, RESOLUTIONS AND
SUMMARY OF STATEMENTS.



LONDON:

PRINTED AND PUBLISHED BY
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PROGRAMME.

PRELIMINARY APPOINTMENTS.

- July 5th. British Empire Timber Exhibition (Opening Day).
 July 6th. Visit to Kew Gardens.

OPENING SESSION.

- July 7th. Public Meeting at 11.30 a.m. in Guildhall, London.
 Delegates entertained to a Luncheon given by the
 Forestry Commissioners.
 Presentation of Statements by Delegates at
 2.30 p.m. in the Council Chamber.

TOUR IN CROWN FORESTS.

- July 8th to 10th. Dean Forest, High Meadow and Tintern
 Woods.

OFFICIAL SITTINGS IN COMMITTEE—FOREST POLICY.

July 12th, 13th and 14th.

TOUR IN SCOTLAND.

- July 15th. Edinburgh—Visits to Botanic Gardens and
 University. Delegates entertained to Luncheon
 by the Lord Provost at the City Chambers.
 July 16th. Colonel Steuart-Fothringham's Estate at Murthly.
 July 17th. The Seafield Estates—Speyside.
 July 18th. Lord Lovat's Estates at Beaufort.
 July 19th. Sir Ronald Munro Ferguson's Novar Estate.

OFFICIAL SITTINGS IN COMMITTEE.

July 20th and 21st.

RECEPTION BY HIS MAJESTY THE KING.

- July 21st. At 11 a.m. at Buckingham Palace.

CLOSING SESSION OF THE CONFERENCE.

- July 22nd. 11 a.m. : Presentation and Discussion of Resolu-
 tions.

BANQUET.

- July 22nd. 8 p.m. : Delegates entertained as the Guests of
 His Majesty's Government at a Banquet.

VISIT TO WINDSOR FOREST AND WINDSOR CASTLE.

July 23rd.

PREFACE.

It was agreed by the British Empire Conference in settling their rules of procedure (*see* pp. 62-63) "that a Committee be appointed to make a précis of the Speeches of the Delegates and Associate Delegates for inclusion in the official report of the Conference which official report will include :—

- (a) The Statements from the various parts of the Empire.
- (b) The work at the Conference
- (c) The reports of the Sub-Committees.
- (d) The resolutions passed by the Conference."

In issuing the report in its present form the Forestry Commission have consequently certain explanations to make.

Owing to the fact that the Overseas Delegates, before arriving in England, had entered into engagements for the full period of their visits, it was impossible to get a Committee together to undertake the lengthy work of précis making, which has therefore fallen to the undersigned.

In carrying out this task every endeavour has been made to present the actual words, as well as the sense of the debates, but where it has not been possible to do so in full excissions have been made solely with a view to keeping the size of the volume within reasonable limits.

It has been found impossible on the score of cost to reprint in full the Statements, which consist in all of 514 printed foolscap pages, but a summary of them has been included instead. Owing to the form in which the material was presented and to the necessity of extreme condensation this summary is admittedly neither a full nor an adequate analysis of the forestry position of the Empire as a whole. It seems to us, however, that every Forest Authority ought to be in a position, in due course, to furnish clearly and with some approach to uniform method the information which the various heads of the Statement call for, and we trust we shall have made a useful contribution to the proper accomplishment of that task in presenting a summary, however imperfect, of the present position.

The Conference had the honour of being received by His Majesty the King at Buckingham Palace on July 21st, and the Address presented on that occasion and His Majesty's Reply are printed on pp. 303-304.

F. D. ACLAND,
R. L. ROBINSON.

Forestry Commission,
22, Grosvenor Gardens,
London S.W.

December, 1920.

THE BRITISH EMPIRE FORESTRY CONFERENCE.

FIRST MEETING.

Wednesday, 7th July, 1920.

Held at the Guildhall, London, E.C.

The Right Hon. The LORD MAYOR OF LONDON, in welcoming the Delegates, said : My Lords, Ladies and Gentlemen, I am very glad to welcome the Delegates here to-day, because, to my mind, Forestry is a science which has been very much neglected in this country. It is only the War that has brought us to our senses in that respect, and shown us our great neglect of the science of Forestry. It has been found necessary to ask the forest services in India and also in our Overseas Dominions to give us the benefit of their experience, and to come here and consult together and assist us. It should be possible for the Empire Forestry Conference to make a fair preliminary stock-taking of the timber resources of the Empire, because the amount of the shrinkage of the timber throughout the world has increased very much indeed, and we shall find ourselves in very great straits unless we give our attention to this very important matter. I trust, therefore, your deliberations may result in the good of the science of Forestry in general and also of our own country, Great Britain. (Cheers.)

LORD LOVAT : My Lords, Ladies and Gentlemen, I hope I may be allowed in a word, in the name of the Delegates and the associate Delegates of the Empire at Home and Overseas, to thank the Lord Mayor for his kindness in presiding here to-day, for the generous words with which he has welcomed the Delegates, and also for the great honour he has done us in allowing us to hold the First Empire Forestry Conference in this historic Hall. (Cheers.) The Lord Mayor has touched on the great importance of Forestry to the Empire, he has also indicated the benefits that may accrue to Great Britain—the largest Timber Importer in the World—by taking Council with the Delegates from Overseas for the provision of supplies from within the Empire. I will only ask you to return to his Lordship a very cordial vote of thanks for the honour that he has done us, and I shall ask the Senior Forester here, Mr. Mackay, from Australia, to second that resolution.

MR. MACKAY : My Lords and Gentlemen, as a representative of Australia, and, as I understand, the Senior Forester here, I have much pleasure in seconding the vote of thanks to the Lord Mayor.

(The motion was passed by acclamation.)

THE RIGHT HON. THE LORD MAYOR : My Lords and Gentlemen, I thank you very much for your kind vote of thanks. I am only too glad to welcome you here and also, if I may say so, to be, in some humble way, of assistance at this very great and important Conference. I thank you very much.

(The Lord Mayor then retired and the Right Honourable Viscount Milner, the Secretary of State for the Colonies, took the Chair.)

THE CHAIRMAN : Gentlemen, I am going to call on Lord Lovat to deliver the opening address.

LORD LOVAT : My Lords, Ladies and Gentlemen : Before opening the discussion on the subject which has brought us together, I would like to say one word of personal explanation on behalf of my colleagues and myself about the action of the British Forestry Commission, in point of age and experience the junior Forestry Authority of the British Empire.

When the suggestion was made from Canada and India that it would be advisable to hold a British Empire Forestry Conference at the same time as the Empire Timber Exhibition, it was necessary for some forest authority to take the responsibility for issuing invitations and for making the necessary preparations. It seemed to us to be the moment to lay aside the rôle of the Cinderella of Empire Forest authorities and take up a part for which we knew our inexperience made us in no way qualified.¹

The representative nature of the meeting to-day shows that the decision taken was a right one. I am glad to be able to report that we have here to-day representatives from practically every portion of the Empire.

The work of preparation has been heavy and on account of the shortness of time and the distances over which communications have had to pass, decisions have had to be made about questions over which we should have wished to consult you. The High Commissioners, Agents General and Departmental representatives have given us every help and assistance and we hope that the majority of the recommendations made in the programme, which we have submitted to you, will meet with your approval.

IMPORTANCE OF FORESTS.

I will open the discussion by asking you to consider firstly the importance of forests and the products of forests to the British Empire. Secondly, to consider the apathy of our race in all questions connected with forestry, our story of neglected opportunities in the past, and the necessity for stimulating an interest

in forestry in the future. Thirdly and lastly, to look for a moment at the long vista of opportunities which community of purpose and action may open up to the constituent units of the Empire.

It is not necessary at this stage of our discussion to enter at any length into statistics of Empire resources or the Empire timber trade. When India and the British Dominions Overseas present their reports, we shall hear at first hand how much the interests, and in certain cases one might almost say the fortune, of individual states, is bound up with the forestry question.

It is sufficient to say as regards the British Isles that the value of our timber imports in 1919 reached the colossal figure of £72,000,000, that they will probably approach £90,000,000 to £100,000,000 this year, that our timber imports require some 13 per cent. of the total British tonnage for transportation, that before the War 10,000,000 tons of timber and timber products were brought into this country, which represents a tonnage space equal to that required for the whole of the grain imports and greater than that required for all the other foodstuffs put together with cotton and wool thrown in as well.

The part which timber plays in the life of every civilised State is set out by John Evelyn in his *Sylva* "A Discourse of Forest Trees" (17th Century) when he says:—

" Since it is certain and admissible that all arts and artisans
 " whatsoever must fail and cease if there were no timber and
 " wood in a Nation (for he that shall take his pen and begin
 " to set down what art, mystery or trade belonging in any
 " way to human life could be maintained and exercised with-
 " out wood will quickly find that I speak no paradox) I say,
 " when this shall be well considered it would appear that we
 " had better be without gold than without timber."

These are weighty words, as applicable to-day as they were 200 years ago, and if we accept them, as we must accept them, the question we have to ask ourselves is, " Is our forest policy, is our forestry practice as a whole worthy of our Empire? Are we as a unit of civilisation taking the necessary steps to preserve the great heritage of timber to which we have succeeded? "

Let me take Great Britain first—for criticism, like charity, should begin at home—we in Great Britain were the last European State to adopt a forest policy, with hesitating steps, and haltingly at 25 years' interval we followed that enlightened country, Turkey, and established a Forest Authority. Of all nations of Europe we have the smallest area of State forest; we have by far the least area of wood per head of population, and with one exception are the most poorly wooded country in proportion to our area of land. We lead in one thing and one thing only—the number of Inquiries, Royal Commissions, Departmental Committees, which have examined and re-examined the forest situation in Great Britain, without, until 1919, doing anything effective to have it improved.

If we pass from the forest history of this country to the Dominions and Crown Colonies we see the attitude of indifference of the Mother Country continued, sometimes even after they had emancipated themselves from her control. France by 1830 had established an Algerian forest programme. It was not until 1855, under Lord Dalhousie, that India led the way and was the first of the Colonies to organise a forest service.

We shall hear, in the course of our discussion, the date of establishment and conditions of forest service in the Dominions and Crown Colonies, almost all of whom have taken action before the home country. Many of these forest authorities have done admirable work, but some are still conducted without sufficient funds, and in certain cases no definite and permanent policy has been laid down.

If we take the case of our blood relation, the United States of America, we find an almost exact replica of our own policy of inaction. As early as 1799, possibly under French influence, the first forest legislation was attempted. Up to 1890, nearly a century later, a comprehensive federal forestry policy was still under discussion. It was not until 1903 that a separate and untrammelled forestry service was established, and, like us, it was not until the devastation of the woods had brought it home to the people that effective action must be taken, that extended "reserves" were placed under State control.

It is an unfortunate fact, but one that it is necessary to mention, that while our race is the least interested of all nations in forestry science, we are of all nations the most active in the destruction of forest resources. Canadian saw-mills, American logging organisation, New Zealand and Australian axemen are the last word in efficiency and despatch. Almost every devilish invention for the destruction of growing timber owes its conception to the Anglo-Saxon mind. (Laughter.) Even the art of fire raising whether from carelessness in clearing felled areas, the picnic habit or the gentle art of the progressive settler have to this day of world timber shortage enabled us to continue our reputation, if not our practice, of destroying by fire a high percentage of the timber which might be put to commercial uses.

The apathy in forest progress is not local or periodical, it is permanent and racial, and it is important to realise the fact if we are to combat it effectively.

If we glance for a moment at the forest history of Europe we are struck by the fact that in the Middle Ages whilst forestry laws on the Continent were being built up on national and constructive lines our forest laws were based on injustice, cruelty and repression. The forests, or rather game preserves, of William the Conqueror and his successors—some 68 or 69 in number—were established by the expropriation of the rights of individuals, and in certain cases the destruction of villages and the wasting of whole country sides. The Norman rulers' forest laws were regarded by rich and poor, cleric and laymen, as galling acts of Royal despotism, and though repealed in part at the time of the

Magna Charta and by subsequent enactments, were not finally abolished in their entirety until from 1760 to 1817.

It is a significant fact, whether arising from British dislike of forests or lack of appreciation of the possibilities of communal forest enterprise, that the area occupied by the British during the French Wars of the Middle Ages is the only area in France where no communal forest exists, and this in a country where five million acres of communal forests are to be found in the departments untouched by British rule!

There can be no doubt we have lost a great deal from the fact that the treatment of forests in Great Britain has been entirely individual. Instead of having a high percentage of the rural community interested in forestry as communal owners, imbued with a good working knowledge of timber yields, prices and produce, we have a complete ignorance of forestry life and forest values.

Failure to establish State forests has been—by lack of precept and example—a serious handicap to progressive forestry in Great Britain. It is from lack of this that much of the forestry of to-day, not only in Great Britain but in those parts of the world mainly occupied by men of British descent, has often been haphazard and unsatisfactory.

The extent of virgin forests that have been acquired by the Empire at different stages of her growth has, no doubt, tended towards carelessness and indifference. In this respect we have been the spoilt darlings of fortune. We have succeeded to vast areas of exploitable woods and have only had to draw on new territories to meet our increasing requirements.

It is probably owing to this fact, as well as to the fact that we are essentially a practical rather than a far-seeing and imaginative race, that we have allowed our capital in the shape of woodlands to be destroyed for immediately realizable assets in the form of grazing or agricultural extension.

Let us not imagine for a moment that this was a practice confined to the Dominions. Individual State reports may, in the past have estimated 22 trees destroyed for every tree brought to the mill, but we in Great Britain are equal offenders. In the 16th Century, within 100 years of the removal of the more stringent forest laws, anxiety was already expressed about the destruction of woodlands. First for smelting, then for sheep, devastation proceeded apace up to the 19th Century. Even to-day it is none too certain, unless effective aid is given, that the all too small forest areas denuded during the War will be replanted.

If we sum up these points, they are :—hereditary hostility to forests and forestry arising from repressive and unfair legislation, lack of appreciation, through the absence of communal forests, of forest values and the benefits conferred by forestry on rural communities, failure to realise the wealth producing possibilities of forests through the absence of such forest work on a large scale, and under systematic management. If we add to this a careless habit of thought through the addition of new resources by Empire extension, it is small wonder that we are not forest

preservers, as they are in Switzerland, France, Germany and Belgium, but at heart forest vandals who look on all woodlands as their prey. A single example of what has happened in a country not 500 miles from where we are sitting to-day, will show the different attitude of mind of a forest-loving and a forest-destroying people.

One hundred years ago the Landes, some two million acres in extent, was a barren waste, grazed by a poor and unhealthy type of sheep, aptly described by a local writer as swampy, fever ridden and desolate. This area, by intelligent co-operation between State, communes and individual owners has been turned from the poorest district in France into two of the richest departments of that rich country. In that happy district practically no local rates are paid, firewood can be had almost for the asking. Individual peasants own up to 100 to 300 hectares of what was once barren soil, and now is forest land worth £100 per acre, and bringing in a steady revenue from turpentine and from pit props for the British market. The wages in the district are high, and the shelter and humus given by the trees allow the once sandy waste to be used for viticulture and cereal crops.

If we look at the other side of the picture: In Great Britain there are many millions of acres devoted to sport or carrying not more than one sheep to four to five acres. Much of this land is so unhealthy for stock as not to be able to carry the younger stock in winter. Commissions and Departmental Committees have investigated the yield from this poor grazing land, and, as far as can be gathered from the '73, '82, '92, '08, and '16 Reports it is probably true to say that there are approximately four to five million acres in the British Isles which are either incapable of producing, or are not actually producing more than two pounds to three pounds of mutton, and rather less than one pound of wool per acre per annum. Probably not more than one-third to one-fourth of the total grazing area is suitable to tree growth, but admitting this, and admitting also that, if the low ground were planted, the high ground would be thrown out of gear and only available for summer grazing, it is certain that an extension of the planting area would greatly benefit the general community.

The following comparisons between an acre of land under sheep, and an acre of land under trees are important.

(1) Continental experience shows that during the planting period 100 acres, and during the productive period 50 acres, of forestry land gives employment to one man.

Hill grazing of the nature described gives employment to one man to about every 1,500 to 2,000 acres.

(2) Forestry gives throughout a coniferous rotation 50 to 100 cubic feet (depending on soil, altitude, species, &c.), of timber per acre per annum as compared to two to three pounds of mutton and less than one pound of wool.

(3) With regard to saving of tonnage—we are importers of mutton, wool and timber—the proportion is as 600 to 800 to 1 in favour of the timber crop.

(4) The value of the annual yield depends on species and length of rotation, but at average prices would be not less than 10 to 1 in favour of a timber crop. If we divide these results by four, that is to say, if we admit than one acre in every four acres of moderate hill grazing is suitable for growing commercial timber, and allow no value for hill grazing above the planting line, and allow no advantage to count from shelter given by plantations to grazings after the trees have reached a certain height, we are still left with the fact that the benefit to the community of planting second-rate grazing is still greatly in favour of forestry. Mr. Acland's Reconstruction Sub-Committee calculated that when the whole of the additional 1,770,000 acres were afforested which were necessary to afforest to secure this country against timber famine in case of a European War, the meat yield of Great Britain and Ireland would only be reduced by less than 7 of 1 per cent.

If there are 4,000,000 acres of the poorer type of grazing land which are not put to the best use in this little group of Islands, it is not difficult to imagine the amount of grazing land in the Empire which for one reason or another has not been fully developed.

It is not my intention to-day to make alarmist statements or to quote panic figures. Without over-stating one's case one can say, without fear of contradiction, that the world's timber situation gives grave reason for thought and enquiry. We are informed by the leading periodicals and other authorities of a world's paper shortage; we read in the report of a recent American Commission that timber is being cut in the United States at three times the rate of growth, that a shortage has begun and will become increasingly acute for several decades. We know that several exporting States admit that they have over-estimated their forest resources. Whole groups of countries have been shut out of the timber trade by revolutions, dynastic changes and the rise and fall in the value of exchange.

Even if we do not accept the idea of a world timber famine, we must admit that never was there a time before in which the Empire depended more on its own efforts for its supply of timber, nor has there ever been a time more favourable than the present for urging the examination of our Empire Resources and, if thought advisable, the definition of an Empire Forest policy.

It is in this connection that I wish, as briefly as possible to deal with three of the many outstanding points on which we as an Empire, might consult and co-operate. The three points that I propose to take to-day are, first, the investigation of Empire Resources, secondly, the question of Forest Policy and the Forest Authority, and thirdly, the question of Education and Research. They are big subjects, and I do not propose to go into them in any detail.

EMPIRE RESOURCES.

I would submit that our first object—which we cannot hope to achieve in its entirety, but towards which we should make

considerable progress at this Conference is the removal of the question of Empire timber resources out of the realms of fancy into the land of bedrock fact.

If we are to put ourselves in a position to make valuable suggestions for future progress, it is essential that we have at all events a good working idea of what one might call our "capital account," that is to say, our assets in the shape of timber and our liabilities in the shape of local and Empire demands, and, what one might call our "profit and loss account," that is to say, income in the shape of annual increments of timber growth, and our outgoings in the shape of annual fellings.

Many tens of thousands of pounds are spent every year in calculating the world's cereal crops. Yet in the case of cereals by the natural laws of supply and demand a few seasons' effort can meet the world's requirements. I would ask you to consider how much money is spent in the whole Empire in calculating what will be the timber position in ten to twenty or fifty years' time. Yet to plan, establish, mature and exploit a timber crop will rarely take less than a century.

Let me take the British Isles as an example. One of the smallest and most closely inhabited States of the Empire, a country with a very low acreage of wood per head of population and yet in which there is no really accurate knowledge of productive acreage, an even more vague idea of the annual increment of growth and only the most casual information of annual fellings and planting. We have got a good many authorities on home timber in this Hall to-day; I wonder whether any single one of them would dare to put on paper what they consider will be the home timber yield either in pit props, sawn timber, or any other class of timber, in 20, 30 or 40 years' time.

If this is so in the British Isles, how much greater is the probability of inexact knowledge in some of the less closely inhabited parts of the Empire?

In certain cases we read from reports that the areas of virgin forests have hardly been explored. The areas wasted by fire, destroyed by settlers, exploited by lumbering companies, are only now beginning to be accurately known. The study of the succession of crops by natural regeneration, the time taken to produce a marketable crop after felling, the effects of fires have it is true been studied at some centres but often without adequate staff and on an insufficient scale.

It is not, however, only in the realm of statistics of area, yield and consumption that information is required. Information on the subject of "Forests in the making" is also necessary: information about seeds and seedlings, methods of collection, successful experiments in afforestation or re-afforestation might succeed in similarly situated areas in other parts of the Empire.

How much money would have been saved if 20 years ago we had had in Britain all the available information about the trees of the Pacific Slope, Douglas fir, Sitka spruce, Western larch, &c.?

How much greater progress would have been made in South African forestry if the whole of the facts about Australian gums had been known when planting was begun in that sub-Continent? Again on the subject of forestry methods, labour-saving devices, &c., there is ample room for an exchange of ideas. Canada and Australia, with their wonderful logging organisation on the one hand, India with its record of tropical and sub-tropical forestry research work, Britain with its access to Continental Schools and Laboratories, all could contribute something to the common stock of information.

From the commercial point of view, information about timber supplies outside the regular trade centres and the uses to which new species could be put, would be valuable. It is understood that the present Empire Timber Exhibition (opened yesterday) alone contains some 20 or 30 species of timber not previously put on the market.

On the military side again the Great War has shown the important rôle that timber has to play. In any War on a large scale a summary of information about Empire personnel, equipment, transport and machinery, as well as local information on the subject of timber in the zones of operations, methods of production and prices, would be important and lead to efficiency and saving of money.

That much of the information that is required does actually exist is admitted; that it is available for those who wish to use it is not always the case. Facts to be of value must be accessible. They must be presented in a form that they can be easily digested; they must be brought up to date by revision at stated intervals, and they must be presented in terms of certain agreed meaning or explained by tables or glossaries making them intelligible to one and all.

That this information in a handy form is required is common ground; how it is to be prepared and circulated will be for the Delegates to discuss and recommend to their respective Governments and Authorities.

FOREST AUTHORITY.

Another group of subjects which might lead to a fruitful exchange of ideas is the question of State Forest Policy; the functions of its Forest Authority and the Forest Authority's relations to other departments.

After many years of travail the British Government in August, 1919 gave simultaneous birth to a Forest Policy and a Forest Authority. I do not propose to enter into the details of the Forestry Bill of August, 1919, but I think some of the principles on which it is based are worthy of consideration, and have been favourably reviewed by Continental Nations. It was decided:—

- (1) that there should be one Forest Authority for Great Britain and Ireland.

- (2) that this Forest Authority should have the control of policy, finance, personnel, education and research.
- (3) that the executive should be decentralised in England and Wales, Scotland and Ireland.
- (4) that a fixed Forestry policy should be laid down for an extended period and that a block grant should be voted for a shorter period (10 years) with certain limited objectives to be carried out during that period.
- (5) that the control of Parliament over finance should be exercised by the annual vote of estimates.
- (6) that the position of forest officers should be secured by including them in the Civil Service after a period of probation.
- (7) that consultative committees should be appointed to represent the various bodies interested in Forestry in England, Scotland, Ireland and Wales.

These decisions give certain very definite advantages to the British Forestry Authority and *mutatis mutandis* are worthy of consideration for wider application.

A definite Forestry Policy over an extended period (80 years) gives stability and confidence and allows working plans to be built upon broad and comprehensive lines. A block grant and a limited objective for the first 10 years induces economy, concentrates activities, but does not exclude the idea of future expansion. The power of the purse held by Parliament gives the necessary democratic control without implying undue political interference in general policy or in the detail of executive work. A single authority for an extended area should mean forestry development under the best silvicultural conditions without undue local interference, while a single forest service means more extended opportunities for promotion and should tend to attract the best brains available. A single authority should lead towards economy by standardisation of improved methods and as far as State subsidies go should tend towards co-ordination in education, research and experiment. A Forest Authority standing alone and immediately responsible to the Treasury for the expenditure of its own funds is in a stronger position to carry out its policy than if linked up with a spending department such as the Department of Agriculture or Lands.

EDUCATION.

Just one last question I would like to touch on briefly, and that is the question of Education.

Of all the questions which the Forestry Commission have had to tackle in the first nine months of their existence none have presented such difficulties as the question of Education and Research.

It is possible that some of the Delegates who are present to-day will have the same tale to tell of dissipation of effort, waste of State subsidy through lack of a co-ordinating policy, duplication of work and inter-State and inter-University jealousies.

State subsidies granted without a policy have led to a very unfortunate state of affairs in the British Isles to-day.

Higher Forestry Education subsidised by the State has been carried on until recently at eight or nine Educational centres, and this notwithstanding the fact that the openings in British Forestry for Forest Officers do not amount to five places per annum!

In France one fully equipped Forest Officers' School is sufficient to supply candidates for the whole of the French Home and Colonial Forest Service. The French woods are nine times the size of the British woods, and the French service nearly eight times as large as the British service.

While there are few openings for employment of Forest Officers in Great Britain, there is on the other hand an unsatisfied demand for fully-trained working foresters, yet there have never been more than three and sometimes only one School for working foresters in England, Scotland and Ireland.

The British Forestry Commission has come to the following conclusions :—

- (1) that the Forest Authority subsidies should be granted only to those centres of Education and Research which are directly required to carry out the State's Forest Policy.

(In the case of Great Britain and Ireland the State's Forest Policy is ultimately the creation of 1,770,000 acres of State forests and the maintenance, as well as the increased yield, of some 3,000,000 acres of privately owned woodlands.)

- (2) that in order to carry out the State's Forest Policy Educational centres are required :—

- (i) For higher Forestry Education and the provision of adequate facilities for the training of men who wish to take up forestry as a career, *i.e.*, the forest-officer class.

- (ii) Education in the theory and practice for woodland management, and the provision of educational facilities for owners and managers of private woodlands who wish to study forestry as a part of an agricultural or estate management course, *i.e.*, the land-owner and land agent classes.

- (iii) Education in practical forestry and the provision of facilities for the education of working foresters and foremen who intend to go in for State or private forest service, *i.e.*, the working foresters and foremen classes.

The Forestry Commission have therefore come to the conclusion that, as far as State assistance goes, their interest should be confined,—

- (1) To assisting in the establishment of the machinery (staff equipment and facilities) for a complete course of higher forestry education at one of the Universities or other educational centre in the British Isles.
- (2) To subsidising certain specialised courses, of which forestry engineering should certainly be one, which can be taken apart from the regular higher forestry

courses as a post-graduate or 4th year course at one or more of the Universities other than that at which the higher forestry school is established.

- (3) To being responsible for the payment of a lecturer in forestry at certain Universities and Colleges where adequate agricultural and estate management courses are established and to setting aside sufficient State woodland at or near those centres to give opportunity for practical instruction in forest management.
- (4) To being responsible for the establishment and upkeep of not less than 7 or more than 10 working Foresters' Schools, subject to certain payments by private owners for the training of estate foresters and foremen.

RESEARCH.

On the subject of Research the Forestry Commission hold that *Forestry* research subsidised by the State should be carried on at the higher educational centre. How far local research and experiment at other centres can be linked up with central research work and under what conditions it should receive assistance from the State, is still being discussed.

The Commission are of opinion that research with regard to the qualities and uses of *timber* and other forest products is not primarily a subject of which the expense should be borne by their funds. It is, however, of most far-reaching and urgent importance, and they are endeavouring to secure that it should be directed by a Research Board upon which the different Government Departments and Authorities interested in timber should be represented, to be set up by the Department of Scientific and Industrial Research.

As far as this Conference is concerned, the question of Forestry Education and Research would appear to divide itself into two sections :—

- (1) Discussion as to how far co-operation in research and specialised courses of instruction with or without State aid can be carried out as between Universities at home and Overseas.
- (2) How can the Universities at home and overseas with or without State aid make themselves fitted to undertake the Education and Research requirements of those parts of the Empire which, from climatic or other reasons, are unable or unwilling to run Educational centres of their own?

CONCLUSION.

May I say one word in conclusion on the subject of the programme which we have drawn up for you? This is the first Empire Forestry Conference that has ever been held; we have had to make decisions and lay out a programme which was useful, instructive and likely to lead to practical results. First of all, we have asked, and every part of the Empire has agreed, that we should start this Conference by the presentation of statements of the position of Forestry in the various parts of the Empire.

We shall hope to have on this table, by this afternoon, a statement of the resources of the Empire, all drawn up in the same way and printed in the same form: these can be taken and bound as one book, and will be valuable for reference at subsequent inquiries.

After we have completed the presentation of reports to-day, it is proposed that we go down to the Dean Forest. I would like to say here that the object is not so much to show you the very humble lines of Forestry which exist in this country as to give you an opportunity for making each other's acquaintance and to work out, on preliminary lines, some of the most important questions which we are going to discuss at the Conference next week. We have only attempted to give in outline a few subjects which might be worth discussion, and it will be for you to decide these points when you meet at the first Delegates Meeting. After the first week's Conference is over it is arranged to go to Scotland, where we hope to show you planted woods, and woods raised by natural regeneration. The natural regeneration woods of the Spey Valley I think should be of interest to Delegates from many different parts of the Empire. We hope to show you Sir Ronald Munro Ferguson's woods which I think will be specially interesting to those from Australia. After that, we return to London to continue our Conference work. His Majesty the King has honoured us by giving us a reception; the following day we go down to the Windsor Woods to see the devastation in His Majesty's Crown Woods which occurred during the War, and finally it is hoped, from Saturday to Monday, that a good many of the Delegates will either go to Ireland, stay with friends in this country, or go down to the Universities where arrangements have been made to receive them.

May I say in conclusion that I would like, not only on behalf of the Commissioners, but on behalf of all Foresters in this country, to welcome you here and to express the hope that, while you are at this Conference, you will have a good time. (Cheers.)

LORD MILNER: Lord Lovat, Ladies and Gentlemen: It is not my intention to detain you for more than a very few minutes. I have come here simply to convey, on behalf of the Government, an expression of hearty welcome to the Forestry experts who are collected here from different parts of the Empire.

This is a very important gathering. I believe it will be regarded as a landmark in the history of forestry and of the Empire. I am afraid that it is quite true, as Lord Lovat has suggested, that in the interest of our reputation as a businesslike Nation it would be well to draw a veil over our treatment of forestry in the past. I am speaking especially of these Islands of Great Britain. The same is true, to some extent, of other parts of the Empire, though not perhaps anywhere quite to the same extent.

Lord Lovat has referred humourously to the fact that—as I believe is true—every great country in the world, every civilised country, great and small, is a long way ahead of us in establishing regular Forestry Authorities as Departments of State. The two last to do so, as he has truly said, were Turkey and Great Britain. Turkey thought better of it, and left us the unenviable distinction

of being the only country remaining without such an establishment. We have won the donkey race. However, awakened as to this—as we have been as to many other of our deficiencies—by the great “shake-up” of the War, we are now anxious to atone for the past and to make up for lost time; and I think it may be found, as it often has been found in our past experience—that though, being, as Lord Lovat says, an unimaginative people, we may be slow to embark in any particular line of progress in which others have led the way, yet when we do wake up we are apt to throw ourselves into the business with considerable energy. I do not think that anybody who listened to Lord Lovat to-day can feel much doubt about the zeal which he is likely to apply to the business, and I am well satisfied that his fellow Commissioners are animated by the same spirit.

Lord Lovat has delivered a tremendous invective with regard to our neglect of forestry in the past. I am familiar with this method of procedure. There is nothing in the world which appeals more to a British audience than a good round-mouthed denunciation of British methods on any subject. It is generally a healthy sign that we are waking up and going to do something with real energy. I believe that will be the case here.

The Forestry Commission, which we have at last constituted, has only been in existence for considerably less than a year. It has already done a good deal of practical work, and it has undertaken active operations. But I believe myself that the most valuable contribution it has yet made to the progress of forestry is its action in calling together the present Conference.

The field of labour before this Conference is enormously great. I have no doubt that Lord Lovat is right in saying that the foundation of all future successful co-operation between the different parts of the Empire in respect of forestry is the establishment of a proper balance-sheet, so to speak, the obtaining of really accurate information as to our forestry resources. That the resources of the Empire in respect of forestry are enormously great nobody doubts, but the estimates of the extent and nature of our forest wealth are very various, and they are still all very largely in the nature of guesses. Some people say that the forest wealth of the Empire represents more than 50 per cent. of the total forest wealth of the world. I am not in a position to say whether that is true. I doubt really whether anybody is yet in a position, even great experts, to speak very definitely on the subject. Undoubtedly the compilation of really practical information on this subject would in itself be a very great achievement and a most important basis for the development of your future work. I mention that merely as one great service that you might render to the cause of forestry. But I am not going to follow Lord Lovat *longo intervallo*—I merely a sympathiser, he a great expert—in the discussion of this subject. I have said enough, I hope, to convince you of the great importance which the Government as a whole, and especially the Department over which I have the honour to preside—the Colonial Office, which is so deeply interested in this matter—attach to your gathering here and to your labours, and I may say, speaking for myself, I shall look forward most hopefully to the result of them.

After an adjournment reports were presented as follows :—

THE UNITED KINGDOM.

The Right Hon. F. D. ACLAND, M.P. (Forestry Commissioner United Kingdom) : Lord Lovat and Gentlemen, as you gathered from this morning's proceedings the Forestry Authority of the United Kingdom is a very new growth in this country. Its history is rather like that of a well-behaved young conifer. It was two years in the seed-bed and one year in the nursery and it got planted out last autumn, and now you gentlemen have come to do the necessary beating-up to help us to grow straight and strong and in the proper way.

I think I cannot do better in showing the changed conditions which have come over forestry in the United Kingdom in the last few years than ask you to compare what you now find, which is a real forest authority for the United Kingdom, thinking of forestry first and last, and all the time, although keeping closely in touch with agricultural departments, with the conditions as they were less than four years ago, when it seemed the most natural thing in the world that when another forestry committee was to be appointed and set up—about the twelfth I should think in lineal descent—I, who knew nothing about forestry, but happened at the time to be simply the Parliamentary Secretary to the Board of Agriculture for England and Wales, should have been made chairman of it. That is the sort of thing foresters always expected and the sort of thing from which they always suffered.

Well, that Committee was appointed and the Committee, unlike their chairman, knew a great deal about forestry, and we had a happy inspiration to do our own work out of our own brains and not to receive evidence from anybody whatever, and after a time, I think, thanks largely to that, we presented a report, and being then a very tender seedling we had to run the gauntlet of many dangers from floods and droughts and pests which threatened us in all directions. We escaped from them somehow, by a miracle, and we all owe a good deal to Lord Milner and to two gentlemen who were appointed by the Cabinet as a Cabinet Committee, Lord Curzon and Mr. Barnes, who saved us from the worst danger of all, that of being starved in an official pigeon-hole of neglect. But at last we got lined out as an Interim Forestry Authority and succeeded in passing the Forestry Act, and after many further perils we last November got really started as an authority.

I can assure you that it was with a very glad heart that I, who was in no way a specialist on forestry questions, was able then to hand over the chairmanship of these authorities to Lord Lovat, who, as you have seen this morning, knows a very great deal about the subject and, I may add, has a remarkable way of getting things done.

Now we come to the Report. The first section, as you know, is a general description of the British Isles, and as you are probably as well aware as we are, there is an extraordinary range of geological conditions and a considerable variation in climate. You have had some samples of it to-day. But this is rather a remarkable thing for a country which has this range of conditions of climate and geology, that it is practically true to say that any tree which will flourish anywhere in the United Kingdom will, at any rate, survive anywhere else in the United Kingdom. The range is not such as to make any tree which flourishes in one place impossible of life in another.

Then the second section concerns the main types of forest growth. I hope you will read that section of our report if only to see how completely we were in times past a forest country. The sheep and the cattle and the corn and the people are merely modern interlopers upon what would otherwise have been a first-class forestry proposition almost from one end of the country to the other, and we are now only trying to get a little bit of our own back in trying once more to establish forests in parts of the country which, in old times, were covered with trees.

Then there is the area of forests, and the figures roughly are simply that whereas in the United Kingdom we have 100,000 square miles of agricultural land we have 5,000 square miles of forest land, and of that 5,000 square miles although you would think that in the United Kingdom, at any rate, we were always pretty conveniently situated for transport, less than three-fourths is merchantable and more than one-fourth is unprofitable or inaccessible.

I pass on to a description of our timbers for which we are very much indebted to Professor Groom, of the Imperial College of Science and Technology. He gives a description of our indigenous timbers which is rather too long to attempt to summarise here.

As to ownership, the fifth section, out of 5,000 odd square miles of timber the State owns only 134 square miles; corporate bodies own 55 square miles and private owners own the rest. And here let me attempt in a sentence to pay a tribute to what we in this country, from a forestry point view, owe to the private owners of forest land. We, who are concerned with the work and activities of this very new authority are sometimes inclined to think that the beginning of time dates from the time when we came into existence, but it is really not so. We owe a debt which can never be sufficiently expressed to the people who, through good and evil reports, took care to plant large parts of their estates. What was done by the private woodlands of Britain as a contribution towards our war necessities when we were, owing to shipping difficulties, cut off from the rest of the world, was really very great indeed.

Then there are three points I would like to make with regard to Subject No. 6, the Relationship of the State to Forests.

First we give in our report a summary of our Forestry Act about which Lord Lovat spoke this morning ; secondly, we set out the task which the Forest Commission for the United Kingdom have before them, which is roughly to afforest $1\frac{3}{4}$ millions of acres, roughly $2\frac{3}{4}$ thousands of square miles. We have divided that task into what ought to be done in different periods and have come to the conclusion that we ought to aim at afforesting 200,000 acres in the first 10 years. We are to attempt to afforest 150,000 of the 200,000 acres ourselves, and hope that, with assistance from the Forestry Commission, Private Owners or Corporate bodies will afforest the remaining 50,000 acres. Well, 150,000 acres, if my arithmetic is correct, is something like 235 square miles, and it is interesting to note that up to date since we were started in November we have either acquired, or are in process of acquiring, 225 square miles, that is, within 10 square miles of the amount which we shall have to afforest if we cover our programme in the first ten years. Of course, it will not be possible to afforest the whole of what is to be acquired, and equally, of course, one must acquire a considerable amount of ground in anticipation of afforesting it, because the actual process of afforesting will cover a considerable period.

And, thirdly, we give in that Section a brief summary of what we are trying to do, which shows, I think, more than anything else, how much our policy is still in the making and therefore how much we can be assisted and we can gain by consultation with you in the next few weeks.

Then comes the activities of the Municipal bodies and Societies which show that there is really considerable hope in the afforestation of the catchment areas that our great Municipal Authorities are acquiring for the sake of their water supply. It is a happy thing that Forestry really seems to be of assistance in the conservation of water and in the production of a pure supply of water, and it is very much to be hoped that these great Municipal Authorities will co-operate with the Forestry Authority in the afforestation of their water catchment areas.

Section 9 concerns the Societies interested in Forestry. Here again it is only necessary to say how much we owe to bodies such as the Royal Scottish Arboricultural Society and the Royal English Arboricultural Society and to the two Forestry Associations which exist in those two countries. If it had not been, as I say, that private owners had formed these Associations and Societies in years gone by and had steadily worked towards an organised forest policy, we should not be here now to supplement their work.

Section 10 deals with Education ; that we shall consider in detail later, but the problem may be briefly summarised in one sentence, that we have eight University Bodies teaching Forestry, more or less thoroughly, all of whom look to the Forestry Commission to endow them and to maintain them so far as their Forestry Departments are concerned, but we have only enough money to maintain one of them and to give assistance to others

in minor ways. They all agree with us that it is quite necessary to concentrate on one; the difficulty is when you have to decide which the one shall be.

As to increment, the figures can be summarised fairly simply. We had a gross increment before the War of 52,000,000 cubic feet, that is about one million cubic feet for each week of the year. Now we have a gross increment only of 41 million cubic feet, so far as we can calculate it. That is reduced, by making proper allowances, to a net increment of $47\frac{1}{2}$ million cubic feet before the War and $37\frac{1}{2}$ million cubic feet now.

As to utilisation, before the War, we reckon, so far as we can, we used 30 million cubic feet from our own woods, but now we use 80 million cubic feet. Well, if you are using 80 million cubic feet of your woods, and only producing $37\frac{1}{2}$ million cubic feet per annum, the result, if that process continues, can easily be imagined.

As to Forest Industries, I will again give some quite simple figures. The Timber trades in 1907, which is the latest figure we have—that shows the way we manage our figures in this country—handled £25,000,000 worth of material, and added to the value of that material £21,000,000 worth in so doing, and in the Census of 1911 it was shown that over three-quarters of a million people were engaged in these timber industries which, after all, is no small proportion of our total population.

As regards the Imports and Exports, I will again trouble you with a simple figure. Our Exports were negligible; our Imports, the average of the years 1909/1913 were 10,000,000 loads, with an average value of $27\frac{1}{2}$ million pounds.

As to the summary, coming now to the last Section, we consume at home nearly 11,000,000 loads per annum so far as we can calculate at the present time, and we produce (that is the figure of net increment) something over 1,000,000 loads per annum, a very large excess of consumption over production.

With regard to the outlook, if I have not detained you too long, I will venture to read two or three paragraphs of the conclusion of our Report:

“ On the pre-war basis of utilisation the increment in the home woods was probably greater than the utilization, and the position, as far as the maintenance of the woods at their level was concerned, was reasonably satisfactory. During the War, however, the best timber (and particularly the best coniferous timber) representing some 15 years increment was swept away. The rate of felling is still far above the pre-war rate, and at least double the current annual increment. It is quite impossible to predict how long this state of affairs will continue. If it continues there is no doubt that practically all the useful coniferous timber and a great proportion of the better class oak will disappear in the course of the next ten years. On the other hand, there

“ are certain compensating factors which will probably prevent this coming to pass. Many landowners, who appreciate the position, will refuse now that peace has returned, to place their last reserves of timber on the market. Many woods which were sold provisionally to the Timber Supply Department during the war have, in fact, already been handed back untouched to their owners. Again it is to be anticipated that with the gradual resumption of trade with foreign countries the strain on the home woods will be relieved.

“ In many parts of the United Kingdom, however, a widespread break-up of agricultural estates is proceeding. Hedgerow timber, copses and small woods are passing into the hands of farmers who may not be so careful to tend and to replace the timber as were the former owners. Woods for purposes of amenity or sport found hitherto in the neighbourhood of many large houses will not be so readily maintained now that these are becoming an encumbrance to their owners. The expense of planting, fencing and maintaining plantations tends also constantly to increase. Unhappily, no very effective counter tendencies making for encouragement of forestry are yet in sight.

“ The position is doubly unsatisfactory from the fact that so little planting was done during the last 30 years or so before the War. The figures on page 8, para. 6, indicate that the total area planted in Great Britain from 1880 to 1913 was not more than 554 square miles, *i.e.*, rather more than one-eighth of the woodland area had been replanted in 33 years.”

I do not know what the proportion ought to have been, but I should think at least one-third—probably more nearly half—ought to have been planted in the period of 33 years. Instead of that, only one-eighth was planted.

“ The amount of young timber which is coming forward to take the place of that felled during the War is relatively very small indeed, and it is clear that however vigorous an afforestation policy be followed some 40 or 50 years at least must elapse before the country in respect of its supply of home-grown timber can be in as good a position as that which it occupied in 1914.

“ Steps which should be taken to protect and develop the forestry resources of the country :—

“ Two measures are obviously necessary : First to replant the areas felled during the War, and secondly, to extend the area of woodlands, by afforestating the large areas of uncultivated land (estimated at not less than four million acres) suitable for timber production. A third measure is to secure an enhanced production from those woodlands which are left standing.

“ The means of achieving all three measures are not so obvious. The great bulk of the woodlands are in private

“ hands, and timber production as a business has few attractions when a start has to be made practically *de novo*. The State, therefore, will probably have to rely almost completely on its own efforts in respect of an extension of the area under forest. In respect of woods in private ownership there are methods of subsidising plantations over the early unremunerative periods (such as grants for replanting, remission or adjustment of taxation, and so on), which are now receiving consideration. Many forest owners also would be prepared to plant on a larger scale if it were easier to secure good plants at cheap rates. To what extent such forms of encouragement will prove efficacious, time alone will show. Indirectly, assistance may be given to private owners by providing expert advice and facilities for education, and by making readily available the results of experiment and research. It must be said, however, of the forestry position in the United Kingdom, as of forestry problems in general, that there can be no sudden remedy for an unsatisfactory state of affairs. Continuity of policy backed by unremitting attention to executive work is necessary if effective development is to be attained.

“ Parliament has taken the first essential step in setting up a Forestry Commission, placing forestry business in their hands, and endowing them with a fund on which they can operate with comparative freedom.”

I have the honour, Lord Lovat, of presenting the Report for the United Kingdom—(Applause).

INDIA.

Mr. A. J. GIBSON : Lord Lovat and Gentlemen. I have the honour, on behalf of my colleagues, to present the statement of Forest Conditions in British India, prepared under the orders of the Government of India. The invitation of the Forest Authority to India to participate in this Conference reached us late in January, and this statement was only taken in hand late in February. It was not easy to concentrate in 25 pages forest conditions over a country like India, which can be best regarded as a continent rather than a country. The searching tabulated statements which we were asked to fill in showed us in India that our information in regard to our forests was far from detailed. British India has an area of well over 1,000,000 square miles, and in the course of 55 years, which is the age of the Forest Department, the Government have managed to set aside no less than 250,000 square miles as forest land, roughly speaking, 24 or 25 per cent. of the total area. For the purpose of this Conference we were asked to divide the area of the country into agricultural land and forest described as merchantable, unprofitable and other land. Of the 1,000,000 square miles, roughly 430,000 square miles are agricultural land, 250,000 square miles are forests, and a large figure of 407,000 square miles is “ other lands.” That “ other land ” contains a great deal of village communal land,

which has a certain amount of timber on it, and which helps a lot in meeting the local requirements of the villagers for small timber and firewood.

The second Table we were asked to fill in was the classification of the forest area by ownership, also in square miles. There again the State claim 251,000 square miles of forest land; corporate bodies are estimated to own 8,000 square miles, and private individuals are estimated to own 77,000 square miles, a total of forests for India of 336,000 square miles.

Lord Dalhousie inaugurated scientific forestry in India with a permanent policy in 1855, so, if forestry in the United Kingdom is still in the seedling stage, we can describe ourselves in the British Empire as being, using a forestry expression, in the advanced pole stage.

Section 6 deals with a brief summary of existing legislation, of direct administrative methods of forest development, for example, fire protection, planting of waste areas, regeneration of natural forest. The early days of the Forest Department were a persistent struggle against the ravages of man on our natural forests, and it is due to Sir Dietrich Brandis that we have any teak forests available now for merchantable purposes. It will give you an idea of the vast extent of our forest property if I tell you that the length of our artificial demarcated forest boundaries extends to 150,000 miles, six times the circumference of the earth. It is not, therefore, suprising that for the first 20 or 25 years of our history in India we were largely concerned with forest settlement, demarcation and protection. As in many other parts of the Empire, fire protection has always been a very burning question. We have now managed to get down the area ravaged by fire to about 5 per cent. of the area protected. Protection from fire extends to nearly 50,000 square miles of forest land. The protection consists of burning fire lines, maintaining fire patrols and starting counter fires where fires have broken out. As far as planting waste areas is concerned, the amount of actual plantation done is comparatively small, taking the total area of forests into account. We have only got 247 square miles of plantations, which would represent 0·001 per cent. of the total area on the books of the Forest Department. About half of these plantations have been formed mainly in Burma by taking advantage of shifting cultivation, which is turning a very bad practice to the good of the Forest Department. The cultivators are induced to sow tree seed with their crops, and the method is consequently cheap and enables large areas to be stocked at a very low cost indeed. Of the principal plantations in India perhaps pride of place should be given to the Nilambur Teak Plantation in South Malabar. This now covers an area of, roughly, 6,500 acres, and the total yield Quality I. is computed at over 5,450 cubic feet per acre, the height growth of the oldest coupes being 100 feet with some trees 119 feet high. The plantation was

started in 1842, and the current net revenue per acre is £2 16s., which is a really profitable investment.

In the Punjab we have started large scale irrigated plantations. The local rainfall is insufficient to maintain concentrated tree crops. The Changa Manga irrigated plantation, which was started in 1866, now covers 9,000 acres. *Dalbergia Sissoo* was the species originally cultivated, but it has been ousted by the natural growth of *Morus alba*. The current net annual revenue is £1 6s. per acre, and the out-turn of the plantation is two cubic tons per acre per annum, about 90 per cent. of which is firewood. Further irrigated plantations with an aggregate area of 50,000 acres are being formed in the plains of the Punjab.

It is almost impossible, in the scope of a small pamphlet like this, to summarise even the more important timbers and forest products of India, consequently the Government of India decided to bring up to date a pamphlet which was prepared two years ago, and I hope to have the revised edition out before the Conference meets next week. It is entitled "The work of the Forest Department in India" and it deals with all the principal species and also with minor forest products. I do not propose to say more on that subject now.

The next Section 6 (c) deals with the brief summary of the assistance given to forestry, for example, provision of nursery stock, expert advice, grants to societies, &c., remission of taxes and so on. Exclusive of the areas of forests under the direct control of Government there are very large areas of forest in Indian States, and I am very glad to be able to say that the good results obtained by regular forest management in British India has favourably influenced many of the Indian Chiefs and has caused them to adopt a quite up-to-date policy with regard to their forest estates. Some of them, of course, realise very good revenue. Kashmir State in the North of India, with about 9,000 square miles of forest land, chiefly conifers of the North-West Himalaya, and including "Kuth," or *Costus* root, produces a net annual forest revenue of over £150,000 a year. In Mysore, which has only 3,000 square miles of forest land, the net annual revenue from teak, sandal wood (mainly) and bamboos was for 1917-18 about £222,000.

Section 7 deals with the Forest Authority—organisation, powers and duties, income and expenditure, recruitment and training of superior and subordinate staffs, publications and reports. An organised Forest Department in India dates from 1864. It was originally placed under the Public Works Department of India and was transferred to the Revenue Secretariat in 1871. With the exception of a period of five years (1881-1886), during which it was controlled by the Home Department, forest administration has since been associated with Land Revenue in the Government of India. That must necessarily be so, because the intimate connection of agriculture and forestry is perhaps better shown in India than in any other country in the world.

The country is largely agricultural, and the first demand on the Forest Department are the requirements of the agricultural people. Nowadays not less than 25 per cent. of our output is absorbed by the small landholder in India, and that will always be a first charge on our forestry estate.

Income and expenditure have been growing steadily since the inauguration of the Department. To start with we had to justify our existence by our revenue figures. Now, the broader aspects of the case are beginning to be realised, but still the revenue is increasing and will go on increasing. I may say I have just received the 1919-20 official figures for India, and the gross revenue was, roughly, $5\frac{1}{4}$ million pounds, with a surplus of $2\frac{1}{4}$ millions; that is to say, that last year 3 million pounds was spent on administration and development of the Forest Estates in India.

Our service is also growing. Thus, we have, in the Imperial Forest Service an Inspector-General of Forests, five Chief Conservators of Forests, a President of the Forest Research Institute at Dehra Dun, 25 Conservators of Forests, and 225 Assistant and Deputy Conservators of Forests. The provincial Forest Service and the protective staff bring up the total of our cadre to just under 16,000. In addition, there is a large number of temporary posts. In 1918-19 the salaries, travelling allowances and other contingencies of the Forest Department amounted to well over half a million pounds sterling.

The training of the Executive Staff has been undertaken at Dehra Dun in the United Provinces since 1878, and the training of the rangers has now been de-centralised in every large Province and Burma, Madras, Bombay and the Upper Provinces have got their own colleges.

The Imperial Forest Service, as you know, is trained entirely at home, and the present staff in India has been very largely recruited from Cooper's Hill and Oxford, and in this respect, I cannot let the opportunity pass without referring to our venerable and respected Chief and Master, to whom we owe all our enthusiasm and our sound grounding in forestry, I refer to Sir William Schlich.

Of Publications and Reports there is a goodly number, and at the end of the statement you will find, roughly, two and a half pages filled with the work of Research Officers in India.

Section 8 deals with forestry activities of municipal and corporate bodies, private companies and private individuals. Well, that can be easily summarised: they are practically non-existent, but still the results obtained from our imperial policy are gradually permeating to those bodies, and I think in the course of time they will realise it is better to conserve their forests than destroy them.

Similarly, Section 9, professional and other societies interested in forestry display little interest in forestry, as India has not yet awakened in that respect. The Indian Science Congress, which meets annually at various centres in India, has papers read on forest subjects, and these papers are published by the parent society, namely, the Asiatic Society of Bengal, Calcutta.

We have got our own Forest Journal, the privately owned "Indian Forester." That paper is conducted more or less on the lines of forestry journals elsewhere, scientific papers being interspersed with contributions in lighter vein on sport and allied subjects, while reviews and abstracts also have their place.

It was in the compilation of Table III, Section 11, that considerable difficulty was met with. We realised, when this table had to be compiled, how little we knew about our own forest resources. Provincial figures varied enormously, and some provinces would not tackle the problem at all. They said "No figures available." But still, even adopting a very conservative figure we find that the increment of the merchantable area of forest in India is 1,187,000,000 cubic feet a year. When it came to annual utilisation, the same difficulty cropped up: there were no detailed figures. However, we found that the out-turn of timber and firewood represents 2.2 cubic feet per acre per annum for all forests. The reserved forests figure was a little higher, 3.3 cubic feet per acre per annum. The turn-out per head of population of British India was only 1.4 cubic feet. It is very small, and the figure in Europe and elsewhere is well over 20 cubic feet per head per annum.

Forest industries are summarised in Table V, Section 12: there again most of the figures are estimates. The average annual imports and exports are based on the statistics published in the "Annual statement of the sea-borne trade of British India" and are accurate. These show, strangely enough, that India imports rather more than she exports, but you will have to read the figures for yourselves to see how this result is brought about.

Section 14 (a), Table VII, is a comparison of the total home consumption of home-grown and imported timber compared with the total increment. That is more cheerful reading. India, at any rate, has a balance on the right side, and if you accept the figures that we have taken as provisional, we find that we have got a plus balance of 834,550,000 cubic feet per annum at our disposal. That being so, the probable duration of supplies at normal rates of cutting and growth can be relied on indefinitely.

The statement ends with a short summary of steps which should be taken to protect and develop the forestry resources of the country, and I can do no better than read out a passage here and there. We feel that the foundations of Scientific Forestry in British India have been well and truly laid as the work of demarcation, surveys and settlements of the forests is well advanced. The super-structure, as represented by forest education, trained personnel, research and working plans, is yearly taking better shape. I can not say much about working plans but of the total area under our charge we have got, roughly speaking, 60,000 square miles under working plans, very many of them of a very simple form, but as our knowledge increases, they are getting more complex and more suitable for the purpose in hand. The direction, then in which Indian forest policy

should tend in order to secure the maximum benefits for the country and the British Empire, appears to be towards the maximum application of the principles embodied in the three words concentration, co-operation and co-ordination, and I think this Forestry Conference will help us in India to see how we can apply these principles.

With these principles kept in view, the Indian Forest Department has little to fear and can look forward to the future with equanimity, knowing that it will be fully equipped to meet any demand for forest products likely to arise in India, with probably a big margin in hand for disposal to countries less favourably situated.

Lord Lovat, on behalf of my colleagues, I have great pleasure in presenting the report.

CANADA.

Mr. E. H. FINLAYSON, Forestry Branch of the Department of the Interior, Ottawa (Dominion of Canada): Lord Lovat and Gentlemen, in coming before you to present the Report of the Forestry Branch of the Dominion of Canada, it is my desire to express on behalf of the various forest organisations of Canada our sincere appreciation of the great effort which has been made by the Imperial Forestry Authorities in establishing what would appear to be a unique opportunity for forest administrators and foresters from all over the Empire to exchange views on the most pressing problems to be encountered in forest administration.

I need hardly tell you that within the boundaries of the Dominion there is an area of nearly 3,800,000 square miles—an area almost equal to the entire area of Europe; over 30 times the area of the United Kingdom; larger in area than the United States of America; and that from Atlantic to Pacific one has to travel by rail some 3,600 miles.

On an area so vast it is but natural that conditions should vary considerably, topographically, geologically and climatically, and that these variations should be accompanied by considerable variation in the character of the forests. As a whole, however, the forests of Canada are distinctly Northern, being more scattered, and less complex in their composition, than those further South. It is estimated that about one quarter of the entire area is covered with forests, but that only a little better than one-tenth contains saw timber of commercial size, most of which is, under present conditions of transportation and development, inaccessible.

Although we have about 140 species of trees, only some 60 are sawn into timber or used for pulp manufacture, and only 30 may, at the present time, be considered of commercial importance. Of these, 18 are conifers and 12 broad-leaved. As the broad-leaved species represent only 3 per cent. of the entire cut it will be evident that the forests of Canada are essentially coniferous.

There are six Governments in Canada that exercise the function of forest administration. In the first place the Dominion Government controls all forestry activities in the provinces of Manitoba, Saskatchewan and Alberta, the North-west territory lying to the North, and the Railway Belt of British Columbia—a strip 40 miles in width from the crest of the Rockies to the coast—also a large block in the North-eastern portion of British Columbia, which, by the arrangement made at the time British Columbia came into the Federation, was turned over to the Dominion Government. The efforts of the Forestry Branch are confined, so far as forest administration is concerned, to those three provinces with the addition of those lands in British Columbia. Within the Dominion organisation are several departments or branches having responsibility for the administration of forest lands: also there is the Conservation Commission, an investigative and advisory body which has done much for forestry in Canada. With the exception of Manitoba, Saskatchewan and Alberta all the provinces of the Dominion control their lands and natural resources, and, consequently, responsibility for forest administration rests solely with them. New Brunswick, Quebec, Ontario and British Columbia have definitely organised forest services. Prince Edward Island offers little, from a forestry standpoint. There still remains the province of Nova Scotia where, as yet, no forest service such as could be called by that name has been organised. There are also several Corporations in Canada taking an active interest in forestry.

As to ownership of forest lands, speaking generally, it may be stated that approximately not more than 7 per cent. of the entire forest area has passed from the hands of the State into private ownership. That constitutes one of our main advantages in Canada, particularly when we compare our situation with that of the United States; consequently although large areas of the actual timber on the land are under private ownership, at the same time the actual ownership of the *land* itself lies in the State.

With regard to private forest activities, one of the gentlemen who will follow me is definitely associated with one of the largest pulp companies of Canada and is engaged in the forestry work for that Company. He will make a few remarks with regard to the private forestry organisations in Canada.

I may say, speaking of the organisation of forestry activities in the Dominion Government, that they are largely, so far as administration is concerned, within the Department of the Interior. Within this Department we have several branches, three being engaged, to a greater or lesser degree, in forest administration. These branches are known as the Forestry Branch, the Timber Branch and the Parks Branch. I think it will be hard for some of you to understand why we should have a Forestry Branch and a Timber Branch, and I may say it is very hard for us in Canada to understand that also. There is also the Parks Branch, which administers a considerable area of parklands, some of

which are within the Dominion Forest Reservation. Beyond that, within the Dominion Government organisation we have a body which is largely engaged in investigative and advisory work, namely, the Conservation Commission. This Commission has to date done very valuable work in Canada. Their work entirely lacks administrative features; at the same time they have done much, and have been a strong factor in the inauguration and building up of the different provincial forest services of the country.

As to professional and other societies, practically all we have—setting aside the small clubs which may have been organised—is the Canadian Society of Forest Engineers and the Canadian Forestry Association. The functions of these two organisations are, I think, the same, as will be found in similar organisations in any part of the world, the Canadian Society of Forest Engineers being an organisation of technical foresters of the Dominion, and the Canadian Forestry Association being a propagandist organisation, which is comparable, I think, with other forestry associations in other parts of the world.

As to educational work, what I might call the higher education in forestry is confined to three Universities in Canada at present, namely, Toronto, New Brunswick and Laval. It is expected that the University of British Columbia, at Vancouver, will, within a very short time, start in with the organisation and conduct of a Forestry School at that place.

In view of the fact that there are several other foresters in Canada that have to do with the individual provincial organisations I shall not take up more of your time.

Lord Lovat, I have the honour to present to you the Report of the Government of the Dominion of Canada.

BRITISH COLUMBIA.

Mr. M. A. GRAINGER, Chief Forester, Provincial Forest Service (British Columbia), My Lord, Chairman and Gentlemen : My problem is not so much to talk to you about British Columbia as in a rather breathless way to “ hit the high spots ” within five minutes. I will try to do what I can. Roughly speaking, half the timber in the American Continent is in the west—the Pacific Coast, the Rocky Mountain region. In Canada, half the merchantable timber is in British Columbia; in fact, there you have the last great stand of merchantable soft woods in the Empire, and there, too, the last great reservoir of pulp wood. From the Imperial point of view our resources are of great importance.

Forest history with us, of course, starts with the original condition in which the forest had no value. It was like Polar ice, nobody thought it was any advantage to take and hold it under any conditions. Then about 1905 there was sudden recognition all through the North American Continent of the value of standing timber, and we had a boom in alienation all through the west. In British Columbia, very suddenly, some 14,000 square miles were taken up by private investors. There was no

Forest Service then. The Forestry Service was formed afterwards to deal with the situation thus created, but, luckily, certain fundamentals had been looked after. For instance, there had been no sale of forest land, merely an alienation of cutting rights upon the present timber crop. Secondly, the price at which the timber was alienated had not been fixed. The unearned increment of value was still reserved to the State to some extent, so much so that there is now actually a sliding scale based on the average selling price of sawn lumber on which the Government gets its revenue. It was left to the State to control methods of cutting, though we have so far done precious little in this way for reasons which I will indicate. The net result was that this system made the Government a partner in the lumbering industry, in the profits of it, with an increasing revenue every year from a yield-tax levied on the timber cut.

About 10 years ago a Forestry Commission was appointed, and a little later there was created a Forest Service. A certain peculiarity about this Forest Service is that it does focus in a rather unusual way all forest activities of whatever kind. About 1909, 1912 there was a considerable development of forest industries activities.

In view of the partnership position of the Government, the extraordinary extent of the forests, and the general commerce depending on them extension and protection of markets for our timber are matters in which the Government is directly concerned. That is a question we want to take up at this Conference, in reference to inter-Imperial trade. Our main market for export lies around the Pacific, with India and South Africa, and a trade in certain lines to the United Kingdom. Any way in which trade can be developed by the efforts of this Conference will be very much appreciated by us.

The forest industry is practically our major industry, employing many men and involving considerable investment. Our forest revenue runs from some £600,000 to £800,000; it represents about one-third of the total provincial public revenue and affords considerable relief to taxation. Therefore, you see that our forest service must be mixed up with commercial business and must help develop the industries, encourage legitimate investment, and deter, if it can, the kind of wild speculation which hurts a country. Working on those lines, we have been able to establish very close co-operation with the industries. At first, I remember, eight years ago, feeling was very hostile; it was felt by lumbermen that some academic system of forestry was to be forced upon an industry that could ill afford it. However, in the upshot we have all shaken down together. We have adopted the Whitley Council system, brought representation from the industries into every phase of Government activity in which they are interested, and the net result has been the establishment of a good state of feeling and the recognition that, after all, there may be something in the forestry point of view. Support for forestry is coming from the industries, and so it comes about that I represent at this Conference not only the Government, but also the lumbermen. With us forestry is really a human problem.

It means educating public opinion as has been done, for instance, in forest fire prevention in the west. There we have shown that it is not so much a matter of fighting forest fires, as a matter of publicity—getting the public to realise that a little more care is all that is wanted to prevent a fire. Ten years ago people thought it absurd to spend money on fire control—fires were like the rain in England, a natural phenomenon—but nowadays it has been shown that it pays to spend money not so much on fighting fire as on propaganda. Similarly, our main forestry propaganda is simply the establishing of a high standard of public service, giving good advice to the forest industries, and building on that for further progress. We cannot save waste in the woods until we have a calibre of man recognised as competent by the industries, in every practical question, and that is the trouble, to get that calibre of man into the Government service under Civil Services conditions in contrast with better ones in the commercial world outside.

As far as examination of the forests is concerned, we have been able to do little. We had started to do it before the War, but the War took the men away, and now they have come back the inevitable tendency is for their efforts to be “mopped up” in current administration. Our Minister of Lands is constantly urging us to do more than we have done to investigate conditions. It is a critical moment because we have this impoverishment of personnel, partly caused by the War and partly by the attraction of other industries. The full strain of commercial demand has not yet been felt by our western forests. It will soon come. Supplies in Eastern Canada and the Eastern States are steadily diminishing, the Southern States are over their peak of production, and the demand is coming west more and more each year. Moreover, the Pulp Industry hitherto has not come west at the same rapid pace as the Lumbering Industry; it is coming very soon to join in the demand on our forests. We need these industries to develop our resources, but we must study what is happening in the forest. We are just “cutting blind” at present. That is where we look with very considerable interest to this Conference, so that some organised system of research may be started throughout the Empire. In our own country we must try to establish conditions that will attract the right calibre of men into the forestry business. When you have the right men in, the rest will follow.

My Lord, I have pleasure in presenting British Columbia's Report.

QUEBEC.

Mr. A. BÉDARD : (Assistant Chief Forester, Provincial Forest Service, Quebec) : Mr. Chairman and Gentlemen : I must apologise for not being able to present a printed report on the Quebec Forests. On account of the fact that I was chosen but of late as a delegate, I have been forced to prepare this report in London, where I expect to have it printed. If you will allow

me, I will endeavour to give a brief summary of the forestry conditions in the Province of Quebec.

Though the total area in Quebec covered with forest vegetation is estimated at 515,625 square miles, there are not more than 203,125 square miles of merchantable timber more or less accessible.

Considered in their entirety, they may be said to constitute a very important timber resource in the British Empire, through the great quantity of soft woods suitable for lumber and pulp, the great facilities for their exploitation and the considerable quantity of available water-power.

They may be divided into 3 quite different zones coinciding with well marked physiographical units. The plain or St. Lawrence valley zone; 2nd, the Alleghanys zone; 3rd, the Laurentian zone.

1. The plain zone is the habitat of hardwoods of many various kinds (which are described, I understand, in the report on Canadian Forests) and of very fine growth. In this zone were the first attempts at settlement made, the first farms established. The forests, mostly owned by private individuals, do not constitute a continuous whole, but are broken up into a large number of more or less extensive stands. In this section, lumbering on a small scale and trade in special kinds of wood products are carried on.

2. The Alleghanys zone is a mountainous section. It is a region especially favourable to the growth of evergreen trees for sawlogs. Though a good deal of the colonisation lots may be found in this section, there is still a considerable area of Leased Crown timber-lands. Extensive lumbering operations are carried on in that zone particularly favoured with railway transportation facilities, and a large percentage of the pulp wood exported from Quebec to the United States comes from these forests.

3. The Laurentian zone is the most important of the three, considering the extensive area of commercial timber lands, the quantity of available water-powers for industrial purposes, the great number of rivers suitable for log driving. This zone, especially in its western section, is the habitat of the well-reputed white pine. Moreover, there are to be met with very extensive and very dense stands of black and white spruce, of white birch and of aspen. Most of the pulpwood industry is confined to this zone, and the greatest portion of the Leased Crown lands and of the Crown vacant lands is therein located.

With the exception of some 11,000 square miles, the Quebec forests are under the control of the Provincial Government. Of these some 70,000 square miles are under lease to lumber and pulp manufacturers.

Taken as a whole, the Quebec forests are estimated to contain 38,750,000,000 cubic feet of timber of all species. They are valued at more than \$600,000,000. Annually, some 125,000,000

cubic feet of timber, pulpwood and other wood-products are cut from the leased timber lands, bringing to the Provincial Government in the way of rentals, stumpage dues and penalties over \$2,000,000. It might be said that the cut of timber and pulpwood on private lands is about equal to the cut on leased lands. Fully 55 per cent. of the wood products are exported either to Great Britain or to the United States. The exportation to the latter country consists chiefly of pulpwood. As far as forest products are concerned, Quebec ranks first in Canada, with some 2,600 establishments in which wood is used as the main raw material. The most important of these establishments are the saw mills numbering 2,200, and the pulp and paper mills numbering 33. The latter industry has made very remarkable progress since 1900 and more particularly so since 1910, when the Government prohibited the exportation of pulpwood cut on the leased timber lands, thereby compelling the manufacturers to erect pulp mills in the country. The last available statistical figures show the value of the forest product to be \$40,761,730.61, of which \$19,685,740.27 must be attributed to the sawlogs and \$15,193,141.00 to the pulpwood.

Besides the restriction already referred to by which lessees are compelled to manufacture locally the pulpwood into pulp, other restrictions have been imposed upon lessees. Such as, for instance, the obligation to cut only the trees of a certain diameter. This diameter-limit, fixed by Orders in Council varies according to the species of trees. The lessees are also compelled to provide for an adequate protection of their timber limits against fire.

The Department of Lands and Forests has the administration of all the Crown lands either leased or unleased. In this Department a special branch is concerned with the surveying and the sale of lands which have been found by forest inspectors to be more suitable for colonisation purposes. The Forestry Service created in 1909 has charge of the exploitation of the unsurveyed territory; of the lands classification as to their fitness for farming or forestry purposes; of the supervision of the lumbering operations on Crown lands; of forest protection against fire; of re-forestation and of research work.

The trained personnel is recruited from the Laval Forestry School which was founded in 1910 and in which, since, its amalgamation with the Surveying School, a 4 years' curriculum is given. This School is designated under the name of École d'Arpentage et de Génie forestier and is affiliated to Laval University.

Recently, efforts have been made to re-forest the waste lands and the devastated forest areas. To this effect, the Government has established a forest nursery where indigenous and exotic species are raised. Since its creation, the provincial nursery has produced, for re-forestation purposes on private lands and on leased Crown Lands, more than 3,000,000 trees. The stock of the nursery is actually of some 4,000,000 trees. In connection

with the re-forestation work, it might be said that the Government has reclaimed more than 300 acres of shifting sands at Lachute, where they were a menace to the close by farms.

The re-forestation work is not, in a rather well wooded country as Quebec, as important as the protection against fire. Timber-berths owners have been of recent years forming associations for the purpose of securing a more effective protection. A more adequate patrol, a more true co-operation on the part of the railways and of the settlers with the associations; a better fire-fighting equipment and better trained men, and the assistance of Government both in money grants and in equipment supply have, to a great extent, helped to diminish considerably the damages done by fire to the forests.

In the actual state of knowledge, we consider the Quebec forests, though they have, in many sections, been overrun by fires, and exploited not always in a conservative manner, as being quite able to meet the present requirements of the lumber and pulpwood industry. The total annual forest output is figured at 250,000,000 cubic feet, while the net annual increment, deduction made of timber destroyed by fire, insects and fungi, over-maturity and the wind, is calculated at 388,850,000 cubic feet. From this, it can be concluded that at the actual rate of felling, Quebec forests could be considered inexhaustible. However, through the development of the lumber industry and through the extensive improvement of pulp and paper plants, the annual felling figures are sure to increase. With proper management, we figure out that about twice more than the actual yield could be cut from our forests.

But, as may be understood, before we get to the point where scientific management is applied to all our forest, before sylvicultural methods are put into general use, a good deal of exploration and research has to be made. With this kind of work we are proceeding as fast as we can, considering the personnel we can dispose of. We have no doubt that in the near future we may have enough results upon which to base a method of forest exploitation which would prove beneficial to our forests and thereby to the welfare of the British Empire.

ONTARIO AND NOVA SCOTIA.

MR. CLYDE LEAVITT (*Chief Forester, Commission of Conservation, Ottawa*): Lord Lovat, and Gentlemen: As the details with regard to Ontario and Nova Scotia are contained to a considerable extent in the Report published by the Dominion Forestry Branch and summarised by Mr. Finlayson, I will give only a brief bird's-eye view of the situation.

In Nova Scotia the great bulk of the timber land is in private ownership, in contra-distinction to the situation in all the other Provinces of Canada. That is one of the oldest Canadian Provinces and land has passed very largely into private ownership. Therefore, the function of the Provincial Government is largely one of prevention of fire and education in proper handling. As a matter of fact, comparatively little progress has been

made apart from fire protection. The forest protection work is administered by the Crown Lands Department; they are considering the appointment of a forester and the establishment of a Forest Service, as has been done in the other Provinces, but the matter has been hanging fire for some years. The delay is partly due to the difficulty of securing men and partly to the financial condition of the Province, there being only a very small Crown timber revenue, and revenues from other sources being required for the support of existing administrative machinery. The Province is pre-eminently at the present time a pulp-wood-producing Province. The white pine which constituted the basis for the early timber industry has pretty largely disappeared, but the pulp-wood forests remain to a considerable extent. A great deal of damage has been done by fire. The timber is largely manufactured within the borders of the Province, and, while a part of it is exported to Great Britain, there are considerable exports also to the United States, where they have a very good market.

In Ontario about four-fifths of the timber land is the property of the Crown. They have a Forestry Branch in the Department of Lands and Forests, but this branch is mainly concerned with forest protection. The forest-planting work is one of the features of the Forestry Branch. They have a forest nursery and furnish planting stock to farmers and citizens throughout the Province, but there has been as yet no beginning made toward the afforestation of denuded Crown land.

Tremendous damage has been done by fire in the forests of the Province and only a beginning has been made in checking this loss. There are new settlements going into the northern part of the Province, known as the Clay Belt, and of course as time goes by these arable areas will be cleared up and cease to become forest areas, so that gradually the forest area of the Province will be reduced.

It is expected that within a very short time the Forestry Branch in the Provincial Government will be charged with the administration of the Crown timber. At the present time there is no organic connection between the Forestry Branch and the Timber Administration, strange as that may seem in a Province like Ontario. The Timber Administration is going on as it did 50 years ago, before forestry was thought of, but the Provincial Government has got to the point where it is seriously considering the practice of forestry on Crown lands. Forestry, almost everywhere in Canada, is still in the earliest stages of infancy.

I might say just a word about the work of the Commission of Conservation which I am representing here and to which reference was made by Mr. Finlayson. Our main lines of work are two. We have made a start toward a survey of the forest resources of Canada. Our report on the forests of British Columbia by Dr. Whitford and Mr. Craig has been published. We have collected data for a similar report on Saskatchewan, which is not quite finished. We are now engaged in the collection of data for the report on the forests of Ontario. Some years ago a report was prepared on

the forests of Nova Scotia at the expense of the Province, it being published by the Commission of Conservation.

Then we have a line of research work which we are carrying on as far as our funds will allow us. We are co-operating with the Provincial Governments of Quebec and New Brunswick and with some of the pulp and paper companies like that represented by Mr. Wilson, the Laurentide Company, Riordon Pulp and Paper Company, Bathurst Lumber Company, Abitibi Power and Paper Company, and Spanish River Pulp and Paper Company. Funds for these studies are contributed on a co-operative basis and we send parties into the field to study the growth of the forests under the conditions as they exist and the conditions which influence natural regeneration. The object, of course, of that work is to find out what is taking place in the forest and to gradually build up a fund of information which will serve as a basis for working plans for the future.

Another line of work in which the Commission of Conservation is engaged is the fire-protection work along the railways of Canada. In this the Commission is co-operating with the Dominion Railway Commission. The Chief Forester of the Commission of Conservation is also Chief Fire Inspector for the Railway Commission. The local officers of the various forest-protection organisations are clothed with authority as officers of the Railway Commission and assist in carrying out the requirements of the Board with regard to maintaining the rights of way free from unnecessary combustible matter, the inspection of fire-protection appliances on locomotives, the ploughing of fire guards in the Prairie Provinces, the maintenance of fire patrols, the extinguishing of railway fires, and so on. In that way we think we are getting some very good results.

NEW BRUNSWICK.

Mr. ELLWOOD WILSON (Superintendent, Forestry Department, Laurentide Company, Grand'mère, Quebec): Lord Lovat and Gentlemen, I am asked to speak for the Province of New Brunswick. The whole situation there can be summed up in a very few words. New Brunswick is one of the smaller Provinces. About half of the land belongs to the Crown, the other half is in private ownership. The cutting exceeds the annual growth by quite a little. In recent years the Province has organised an efficient Forest Authority which is clothed with the necessary powers to look after all the branches of forestry work, investigation, fire protection, supervision of the cutting, and so forth. Since this organisation has come into being the revenue from forest land has been increased very materially.

The Government of New Brunswick is probably in one way in advance of that of any of the other Provinces in so far as they have practically decided to limit their cut to the annual increment so soon as this shall have been accurately ascertained.

I represent here also the Canadian Pulp and Paper Association, which has been one of the strongholds of forestry development in Canada. This is an association of the large pulp and paper companies for mutual advancement. They have a co-operative sales policy and also have co-operated in measures conducive to the protection of their raw material. They have taken steps to co-operate

and work with the Governments in fire protection. They have organised fire-protection associations which have reduced the fire loss in Quebec, at last, to a practically negligible amount. The loss has now been so far reduced that insurance companies will insure forest land.

They have introduced the aeroplane into the service of forestry for reconnaissance work, for the estimation of timber land, and for fire control. I think it is one of the most hopeful signs of forestry in Eastern Canada when the companies who are actually exploiting the forests in a commercial way have come to realise that it is absolutely essential that they provide for their future supplies of raw material. They have very large investments, and they realise that they cannot go on indefinitely; in fact the feeling in the Province of Quebec is that in fifty years at the present rate of consumption and increase of production we shall be in a very bad way for timber. A number of the companies have already begun afforestation experiments. The idea of several of them is to plant two or three trees for every one they cut, and they are going at this in a practical and economical way.

NEW ZEALAND.

Sir THOMAS MACKENZIE, G.C.M.G. (High Commissioner for New Zealand): Lord Lovat and Gentlemen, as I have a very urgent business before me I thank you very much indeed for giving me this opportunity.

I hoped to obtain from New Zealand a report about the timber operations, but that has not come to hand. I have had a few figures taken out which I will submit to you. May I say, before alluding to these figures, how much good I think this Conference will do. It seems to me absolutely necessary that stock should be taken of the Imperial resources, and regulations introduced and economic methods employed in order that forest conservation may be carried out properly.

In our country over 40 years ago we set very considerable areas aside for forest reserves. Unfortunately, subsequent Ministries lifted these reservations no doubt to open up more country for settlements. It is very much regretted that the forethought of our earlier administrators had been set aside and that these reservations had been lifted. We have also a system of setting areas aside for scenic purposes, and that affects forests as well, although it is not intended that those forests should be touched for commercial purposes. We have on the south-west of our country an area of 2,000,000 acres set aside for forests. We encouraged planting of forests in the early days by giving two acres of Crown land for every acre planted, but owing to an omission in the Act providing for this, the persons planting were not required to maintain the country in forest, and subsequently after securing the extra two acres in respect of planting the one acre with forest, in many instances they cleared the original acre that they had planted. That was not infringing the Act, but it was not very nice to contemplate that that had been done.

The area under forest in 1886 was 33,120 square miles and in 1909, 26,678 square miles. There was, therefore, a reduction in 23 years of 20 per cent. in the forest area.

The lands are held under the following conditions. Crown forests, 12 per cent. of the total area, equal to 12,357 square miles; permanent reserves, 3 per cent., equal to 3,298 square miles; alienated forest, 11 per cent., equal to 11,023 square miles. Of the forest country, about 59 per cent. is therefore under the control of the Government, and the natives and others hold 41 per cent.

The cuttings during the last few years have been as follows: In 1916 there were 308,568,278: 1918, 247,000,000: 1919, 227,803,112 superficial feet, a very considerable diminution, but that is largely due to the scarcity of labour in consequence of our young men being taken away to the War.

The State is giving great encouragement to farmers now to plant. In my notes here it states that the trees, the young plants, are distributed at almost nominal prices. As a matter of fact, whilst I was Minister of Forests there we gave trees away to anyone who was willing to plant them, so a great deal of land unsuitable for other purposes is being planted now by private enterprise.

We have endeavoured to preserve the demarcation of our plots, and it is now under strict Government regulation. We have a supply of Kauri which we hope will last 25 years, though under private enterprise it might not have lasted more than seven years.

I was deeply interested in the remarks of the representative from Ontario as to the measures and propaganda in order to prevent fire. We suffer very much from fire because, as you know, there are very extensive deposits of Kauri gum, which is easily ignited. I remember being able to preserve one reserve by giving a neighbour a free farm in the vicinity. The tenure under which he worked was that if no fires occurred in that reserve no rent would be collected from his farm.

We have a Forestry Department now: it is certainly in its initial stages, but is making for excellent work. Our difficulty in the past has been to obtain experienced instructors, directors, and others, but we are now reasonably well equipped and we are employing our returned soldiers very extensively in afforestation. During the last 20 years we have employed our prisoners for planting purposes. It was an excellent use to make of their work, and it had a very good influence on the prisoners. We planted something like, I think, 20,000 acres of forest by these means.

We have very valuable timbers in our country, mostly the coniferous *Podocarpus*, and we have very extensive beech forests. We have some six different species of the *Fagus* and some of these are exceedingly valuable. We have other forest trees which up to the present have really not been properly exploited; I am in hopes that that may be done and that they may be brought into use. Of course in the early days much of our country had to be cleared because of the necessity for settlements. That was particularly the case in North Island, but I do not

wish you to understand that it was all reckless administration; there was a great deal of care exercised from the first in the preservation of our forests, although I have no doubt in many instances very valuable timber was destroyed in order to make room for settlements.

We have had a very interesting report on forests submitted by Sir D. E. Hutchins, and he has an idea that he can liquidate our debt by the planting of a large number of trees in unproductive areas which will in time form great forests. Fortunately we have a fund already for the repayment of our debts, so this is not necessary. At the same time I am firmly of opinion that enormous benefits will accrue to us from proper and systematic carrying out of well-thought-out regulations. I hope later on, perhaps, to be able to supply you with a fuller report containing this and other particulars. I thank you very much for giving me the opportunity to speak out of my turn.

AUSTRALIA.

Mr. H. R. MACKAY (Australia): Lord Lovat and Gentlemen: In presenting to the Conference these Reports from the six States of Australia which constitute the Commonwealth Group, I desire to touch very briefly on the present condition of forestry there. The true forest region of Australia is almost entirely coastal, that is to say, the great tracts of evergreen hardwoods which form the source of the country's main timber supply and afford climatic cover for its streams and springs, extend inland from the shore line in the South-Eastern and Eastern portion of the continent for a distance of roughly 150 to 200 miles, while the main coastal range is generally about half that distance from the sea. In the North and North-West, a series of low table-lands, thinly clad at intervals with eucalyptus hardwood forest, gradually falls to the shore-line, whilst in the West and South-West low mountain and hill-ranges, covered chiefly with belts of jarrah and karri, but intermixed with several other species, form valuable forests in this region.

Between the coastal ranges of the Eastern division and the extensive region of low rainfall in the Central division, the forest gradually becomes thin and scattered in its distribution, although some of the best and most durable hardwoods, such as grey-box (*Eu: hemiphloia*) and the ironbarks (*Eu: crebra* and *Eu: sideroxylon*) are found in quantity on the drier slopes and foothills of the mountain region. These are succeeded on the extensive plains bordering the main river system (the Murray and its tributaries) by a valuable water-loving species, the river redgum (*Eu: rostrata*). Penetrating further inland towards the central plain of the continent and its depressions, the forest growth becomes still thinner and dwarfed in size, consisting of stunted casuarinas, several species of *Callitris* or cypress pine, and low acacias such as mulga, wilga and brigalow.

It will be recognised that the absence of a great central range of mountains with summits rising above the snowline has had far-reaching effects on the climate and forest distribution of Australia and also necessarily on its successful settlement, whether for tillage or grazing. The annual rainfall, which in the coastal district of North Queensland and on the West coast of Tasmania is about 100 inches, on the North-Eastern coast of New South Wales 50 to 60 inches, and in the Alpine district of Victoria 40 to 60 inches, falls as one approaches the central plain to between 5 and 10 inches, whilst there are tracts in this arid unsettled region where no rain falls for many months at a time.

In the early days of Australian administration and settlement, and indeed up to about 12 years ago, no State of the group developed, or regarded as of serious moment to the community, a forestry policy. Great tracts of most valuable hardwood and cypress pine were destroyed by axe and fire, in many cases with the object of clearing good soil and rendering it fit for cultivation, but in many other instances equally good forest, standing on the poorest soils of the lowlands or on rugged mountain and hillslopes was needlessly destroyed for grazing purposes. This widespread destruction resulted in many districts in a serious shortage of timber for railway and public-works supplies, and even for ordinary building construction. Gradually, each State was forced to adopt protective legislation to stop the wasteful alienation of good forest lands, and to make provision for their proper management and control. In three of the States, New South Wales, Victoria, and Western Australia, even more stringent amending legislation has been adopted during the past two years. In the first mentioned two States, Commissions of Management with large powers have been created, and although this has not been done under the Western Australian law, the Conservator there has properly been entrusted with powers which are in many respects practically equal to those delegated to Commissions in the Eastern States.

Here I may mention that in the Victorian and Western Australian law, the all-important matter of safeguarding working plans has been embodied in the Statute. Once a working-plan is framed and put in force it cannot be amended, modified, or suspended, except by, or with the consent of the forest authority. The framing of working-plans has been commenced in all three States.

As regards the survey and demarcation of the forests, much valuable work has been in progress for some years in most of the States, and the extension of this necessary work will soon enable them to determine what areas of forest of commercial value exist in the whole Commonwealth, and what areas must be permanently dedicated for timber and water supply. Recently, the forest authorities of each State met in conference and decided to recommend that a minimum total area of twenty-four and a half million acres should, after full examination and survey, be reserved as National forest. In proportion to the total area of

Australia (1,963,360,000 acres) this represents only 1 per cent. of the land surface of the continent. If we take what is commonly regarded as the safe standard of proportion in Europe, viz., 25 per cent., or one-fourth of a country's territory, our permanent reserves of natural forest appear to be quite inadequate for the requirements of future generations. There is all the more need, therefore, to avoid further fatal delays, to demarcate every acre of good timber-land now obtainable, to put all the reserves in proper working order, so that a sustained yield will be assured; and finally to pursue steadily a constructive policy of extensive planting of both Eucalypts and Conifers.

It will be seen by the tabulated statements in the reports now presented that Australia is, and has been, a very large importer of softwoods from abroad, the annual pre-war imports exceeding five hundred millions superficial, or sixty millions cubic feet, the value of which exceeded three millions sterling. Our indigenous coniferous forest, consisting chiefly of araucarias (*Cunninghami* or Hoop-pine, and *Callitris glauca* (or white Cypress pine) in the eastern division, have been badly overcut and depleted, the Southern States being large consumers of the former timber. Now that the importation of red and white deals from the Baltic has almost ceased, owing to the present European demand, as well as the shortage of shipping, North America, and to a certain extent, New Zealand, will for a limited period supply our shortage in this respect.

In the meantime Australia has less than 30,000 acres of young pine plantations (the bulk of the timber crop being quite immature), and it will thus be seen how utterly inadequate is the provision made in this respect for her future requirements. For some years to come two of the States will be in a position to export to foreign markets their durable hardwoods for engineering and building construction, which are in regular demand. Then the requirements of the local markets must be met, and probably exports, for a period at least, will wholly cease. Then will follow a long period of forest regeneration and improvement, when the wild forest, much of it containing over-matured timber, will be gradually set in order and transferred into extensive reserves of highly cultivated forest, maintained and worked systematically with waste and losses by fire reduced to a minimum. But in unison with this improvement, there must be extensive plantings and sowings of both Eucalypts and Conifers on the treeless or denuded areas of the coastal plain. And, for this work, liberal appropriations of both Federal and State funds must be provided over a fixed period of at least 20 years, but at present, unfortunately, owing to the financial effects of the war, such funds are only available in some of the States at irregular intervals.

As regards the main types of forest growth, these are chiefly Eucalypts, broad-leaved evergreens, which yield timber of great durability for engineering works and also for all purposes of building construction. They are dense, heavy and frequently interlocked in grain, their weight varying from 56 to 70 lbs. to the cubic foot. Several species yield light and easily wrought

timber, e.g., mountain-ash (*Eu: regnans* and *Eu: delegetsnais*), and these are gradually replacing European and American Oak in the manufacture of furniture and cabinet work generally, as well as for cooperage-stock and tool-handles. The durable character of the heavier class of timber yielded by our Eucalypts is shown by the fact that railway sleepers or ties, laid down in the lines without any preservative treatment, last (according to the species used) for periods of 24 to 35 years, whilst timbers used in bridge, jetty and wharf construction, last from 30 to 50 years, and young timber cut in the pole or spar stage for telegraphs and telephones lasts, in position, from 20 to 30 years.

The yield of timber per acre in Australian hardwood forests varies greatly with soil, elevation, and climate. An ordinary eucalyptus forest of fair quality in Eastern Australia, intermixed with other genera, will give an outturn of 6,000 to 15,000 superficial feet to the acre, some other yields in the same region being from 18,000 to 20,000 superficial feet per acre. In South-Eastern Australia (Victoria and Tasmania) the yield in forests of fair quality ranges from 25,000 to 40,000 superficial feet per acre, but in some areas of prime quality the yield has varied between 100,000 and 150,000 superficial feet per acre, and in a few cases the exceptional yield of 200,000 superficial feet per acre has been obtained. These figures also apply to the best areas of Karri in the South-West portion of Western Australia, but the yield of jarrah in the region further northward is much lower, being commonly between 5,000 and 7,000 superficial feet per acre.*

A word as to plantations of coniferous trees. These are chiefly in Victoria and South Australia. In rapidity of growth and yield per acre, the Monterey Pine (*P. radiata*) of California, excels all other species. Plantations 30 years old have yielded from 75,000 to 100,000 superficial feet per acre. The timber is of second quality, being rather coarse in the grain, but tough and interlocked in fibre, and for box and case making in the packing trade it is in great and constant demand, its sale value in the log, at the stump ranging from 9s. 6d. to 11s. 6d. per 100 superficial feet. It is also in demand for floorings and linings, and in New Zealand it has been successfully used in some instances in the building of cottages and bungalows.

In the growing of other species of pine, the best results in Victoria have been obtained with Corsican Pine (*P. Laricio*), the Western yellow pine of U.S.A. (*P. ponderosa*) and Douglas Fir (*Pseudotsuga Douglasii*). Whilst these plantations are yet too young to enable a final judgment to be arrived at, their annual increment of growth is good, the girth increase in favourable situations varying from three-fourths to over one inch. Taking the measurements made over a fair period, we can safely say that the rotation for crops of Monterey pine will not exceed 30 years, whilst under favourable conditions the limit will be 25 years, and for Corsican pine, Western yellow pine and Douglas fir, the rotation will be from 35 to 40 years. With this brief

* NOTE: The unit of timber-measurement in Australasia is the Superficial foot = the American board foot, i.e., 12 × 12 × 1 inches.

sketch I must now conclude. I may say that several of the reports furnished by the Australian States only reached my colleague and myself last night.

UNION OF SOUTH AFRICA.

Mr. C. E. LEGAT, Chief Conservator of Forests (Union of South Africa): I have pleasure in presenting the statement relating to the Union of South Africa. Reference to it will show that South Africa of all the great Dominions is the least well endowed by nature with forest. The most valuable forests are confined to the regions of high rainfall, which are found along the narrow coastal belt and the seaward slopes of the mountain chains which separate the former from the dry interior. At various points spurs from the coastal chains run inland for considerable distances and are more or less forest clad, but the greater part of the vast interior core of the Union, which is essentially a plateau country, is naturally treeless. At the same time wherever the rainfall exceeds 20" per annum and the soil conditions are favourable exotic trees of some kind or other can be cultivated with success, the results naturally being most favourable where the precipitation is highest. Thus it happens that many thriving plantations are to be found in the grass country of the Transvaal, Free State and Natal.

The natural forests are composed of two main types, the dense high forest of the coastal belt and mountains and the Savannah forest, known as Bushveld, and which is found in the Northern Transvaal. Both kinds of forest contain many species, but only the three yellowwoods of the dense forests can be regarded as furnishing timber of general utility like the conifers of the Northern Hemisphere.

These Yellowwoods, which are species of *Podocarpus*, are large trees of 80 to 120 feet in height, and usually 2 feet to 4 feet in diameter. The wood is harder and rather heavier than pine but stronger and superior in appearance, as it is free of the knots so common in that timber. Yellowwood is used for beam rafters, flooring, ceiling and furniture, and when creosoted for railway sleepers.

The timbers of both the dense and Bushveld forests are however mainly hardwoods adapted only for special purposes. Some of them, such as White Pear, Ironwood, Assegai and Stinkwood, are probably unsurpassed for wagon and carriage building, and on account of its rare beauty the local demand for the latter for furniture making and panelling is larger than the supply. In view of its limited timber resources, it is not surprising timber export from the Union is negligible and is practically confined to the two Boxes, Cape Box and Kamassi.

The total area of forest and plantation in the Union is 2,361 square miles, which is but 0·5 per cent. of the area of the country.

Of this area the State owns 37·27 per cent., 61·25 per cent. belongs to private individuals, and 1·48 per cent. to corporate bodies.

Probably just because it is so badly off for forest the State jealously guards what it possesses, and the waste and destruction so prevalent in countries more fortunately situated does not occur. The Forest Laws render the alienation of forest land difficult, and provide on the whole adequate means for protection and control. Elaborate precautions are taken to safeguard the forests and plantations from fire, and bearing in mind the seasonal nature of the rainfall and the sub-tropical climate, the losses from this cause are not abnormal.

The Government and the people of South Africa, of both races and of all shades of political opinion, realise how unhealthily dependent the country is on foreign sources of supply for its requirements for all but rough timber, and even now, when it is only on the threshold of industrial expansion, the Union is forced to import tens of thousands of pounds worth of wood to enable it to market its products, quite apart from the material used for building and other purposes. The position in South Africa is therefore different to what it is in other countries. There the Government and the people are inclined to urge the Department to proceed rather more rapidly than the Department may consider justified with the data at its disposal, whereas in Great Britain, where the question of timber supplies would appear to be proportionately as acute as in the Union and in other countries, pressure is apparently required in the opposite direction. Afforestation is therefore being steadily carried on in South Africa. During the financial year ended 31st March, 1919, over 4,000 acres were afforested, and last year approximately 8,200 acres. The general public are encouraged to plant trees. Over 5,000,000 trees are annually distributed from the Government Nurseries at cost price. Taxation on private plantations is very light and is mainly levied on the profit obtained from the realisation of the crop.

Forest affairs are administered by a special Department which is a sub-department of the Department of State controlled by the Minister of Agriculture. Headquarters are at Pretoria, and the Union is divided into seven conservancies, of which four are in the Cape Province and one in each of the three others. The conservation charge of each conservancy is assisted by District Forest Officers, each of whom is responsible for a district, which again is sub-divided into patrols each of which is in charge of a forester.

Under an interdepartmental arrangement the Forest Department is charged with the management and control of plantations owned and financed by the Administration of Railways and Harbours. On the 31st March, 1919, the area actually afforested on behalf of the Railway Administration was 23,525 acres.

The income of the Department for the year ended 31st March, 1919, was £90,847. In addition, gratis issues of forest produce arising mainly from the exercise of servitudinal rights by natives were valued at £9,626, while the Revenue from the Railway Plantations amounted to £8,869. Thus the total Forest Revenue might be regarded as something over £109,000.

The expenditure for the same period came to a total of £218,400, of which £28,030 was found by the Railway and Harbour Administration. Officers of the Higher Grade of the Department are recruited as far as possible from South African students who have obtained the degrees or diplomas of recognised European or American Forest Schools. The Government grants scholarships for a period of three years to enable selected students to qualify as forest officers.

The junior staff is trained in South Africa at Tokai School. Before entering the school, candidates are required to spend at least a year at a forest or plantation to gain some practical experience.

Efforts to promote afforestation are not confined to the Government, and several municipalities have embarked on schemes of greater or lesser extent on commercial lines, but in the main private enterprise interests itself in the growing of mining timber, firewood, fencing poles, wattle bark, etc., which necessitate only short rotations, and it is left to the State to produce timber for general commercial purposes. I would refer a moment to the Black Wattle Industry. The Black Wattle is not a native tree, but was introduced from Australia less than half a century ago. Its cultivation was promoted entirely by private enterprise, and there are now some 300,000 acres under the crop. In 1919 over £600,000 of bark or bark extract derived from it was exported from the Union. Large tracts of the country, especially in Natal, which formerly were treeless, are now well wooded, and the industry has been of the greatest benefit to the country. The timber of the Wattle is used largely in the Mines of the Witwatersrand for props and lagging.

The Department is not equipped with means for research, and such mycological, entomological and chemical work as has been done in the past has been performed by Officers of the Agricultural Department. Botanical research bearing on the identification of trees and shrubs has been undertaken departmentally to some extent. Recently an expert has been appointed to deal with the seasoning and utilisation of timber, and is now busy with the erection and equipment of experimental up-to-date drying kilns. A lot of experimental field work has been carried out by Officers of the Department, but it is recognised that this should proceed on more systematic lines in the future, and steps are to be taken to that end.

It is calculated that the total gross increment of all forests and plantations in the Union is 105,000,000 cubic feet, the bulk of which is contributed by the Wattle plantations above referred to. About 66,000,000 cubic feet of this amount, valued at £552,000, is utilised, principally in the form of mine props.

As a large percentage of the total increment is derived from young plantations it is naturally not available for use.

A great deal of wattle wood owing to inaccessability is valueless, and is left to rot in the ground.

During the last normal year, viz., 1913, the Union imported £1,558,000 worth of timber. Of this Sweden furnished practically half, Norway about 1-5th, while the United States, Canada, and

Russia, were mainly responsible for the balance in the order mentioned. The volume of importation is computed at approximately 19½ million cubic feet, so that the total consumption of timber in the Union for all purposes may be placed at about 85,000,000 cubic feet, or approximately 12·2 cubic feet per head of population.

As far as mining timber, fuel poles, or rough material of that sort are concerned, the Union can well meet its present and probable future demands, but the lack of a soft timber suitable for general purposes is a serious want and one which will be felt more and more as the country expands and develops. Fortunately, experience shows that pines from other parts of the world which produce such timber can be successfully grown in selected parts of the Union, and the efforts of the Department as far as afforestation is concerned will be largely directed towards extending as rapidly as possible the area planted with these trees. Only in this manner will it be possible for South Africa to become independent of foreign timber, and thus insure itself against the possible shortage in the world's timber supplies and a repetition of the dislocation in development and industry which the shortage of this essential raw material brought about during the Great War.

At the request of the High Commissioner in South Africa, I am representing the Swaziland Administration at this Conference. The Resident Commissioner was unable to furnish a statement on the lines laid down by the Forestry Commissioners, but he has had a memorandum prepared giving information of much interest and value, particularly in regard to the occurrence and uses of native trees. It is estimated that about a quarter of Swaziland is clothed with Savannah Forest. Dense forest only occurs as fringes along the rivers. Timber is little exploited except for native requirements. There are no professional sawyers and no timber-mills.

Parts of the country are well suited for afforestation, but in the absence of a forest staff nothing has been done in that direction except on a small scale by a few private individuals. I now submit the memorandum.

NEWFOUNDLAND.

Mr. D. JAMES DAVIES, D.Sc., Department of Agriculture (Newfoundland): My Lord and Gentlemen, my colleague, Sir Mayson Beeton, who was to present our Memorandum and at the same time to make the presentation speech, was called away a few minutes ago. I am glad though to have the opportunity to tell my fellow colleagues that up to the time of this Forestry Conference I had no intimate connection whatever with Forestry; my only connection with Forestry has been the burning of birch logs and making camp beds with spruce boughs.

I happened to be on various mineral and oil business for Newfoundland, and they cabled asking me to be the representative at this Forestry Conference. It is because I am here representing the smallest Dominion that I have the privilege of making the shortest speech.

NIGERIA, THE GOLD COAST AND SIERRA LEONE.

Mr. H. M. THOMPSON, C.M.G., Director of Forests (Nigeria) : My Lord and Gentlemen, I have been directed by the Colonial Office to present the statements of the Gold Coast and Nigeria. The two Colonies and Protectorates of that name, and the smaller one of Sierra Leone—for which a statement has not been prepared—cover 447,000 square miles; and are situated along the coast of the Gulf of Guinea. I will take the Colony and Protectorate of Nigeria first. The bulk of the information contained in the statement has been furnished by Mr. L. A. Church-King, Acting Director of Forestry, but revised and supplemented by me.

NIGERIA.

The following is a brief Summary of the information given in the various parts of the Statement :—

PART I.

The Colony and Protectorate of Nigeria has an approximate area of 335,700 square miles and a population estimated at $17\frac{1}{2}$ millions. It is situated between the parallels of $4\frac{1}{4}^{\circ}$ and 14° North latitude and the meridians of $2\frac{3}{4}^{\circ}$ and $8\frac{1}{2}^{\circ}$ East longitude, and is bounded on the West, North and East by French Territory. Nigeria may be divided into four main zones :—

(1) A belt of swamp and mangrove forest along the coast line, which attains a considerable width in the delta of the Niger river.

(2) A belt of dense tropical rain forest from 50 to 100 miles wide, adjoining the mangrove swamps.

(3) Then comes a zone of more open country which gradually becomes clearer, park-like land being followed by open expanses covered with high grass. This zone is hilly and even mountainous, especially to the North of Ondo and on the Cameroons frontier.

(4) A vast undulating plateau having a general elevation of 2,000 ft., with higher hills of over 6,000 ft. superimposed on it in parts of the Bauchi and Yola Provinces. The plateau is covered with thin, open forest, which gradually disappears in the North as the sandy tracts bordering the Sahara are approached.

The main rivers of Nigeria are the Niger, with its large feeder, the Benue, and the considerably smaller Cross, Ogun, Oshun and Benue Rivers.

The climate is tropical: hot and enervating near the coast in the heavy rainfall zone, cooler and more pleasant in the interior, especially on the Central Plateau, which is almost bracing in places, and very hot and dry during the Spring months in the more open country to the North and in the Lake Chad basin. During the winter a cold, dry wind blows off the Sahara, and brings with it a dense haze which consists mainly of minute particles of sand from the desert. This wind is called the "Harmattan," and it blows intermittently till the end of March,

when it is followed by the "tornado" (thunderstorm) season which heralds the approach of the South-west monsoon. The latter generally begins about May or June and lasts, with a break in August, till October or November, when another but shorter "tornado" season brings back the "Harmattan."

The temperature varies from 40° F. (with occasional frosts on the higher parts of the plateau) to 118° F., and the annual rainfall from 24 near Lake Chad to 160 inches at Bonny, on the coast.

PART II.

The main types of Forest growth are :—

(a) The *Mangrove Forests* along the tidal shores of the coast. These consist mainly of *Rhizophora racemosa*, *R. mangle* and *Avicennia Africana*. The mangrove forests are inundated at high tide with salt water.

(b) The *Fresh Water Swamp Forests*. These are found growing in swamps caused by the overflow of the larger rivers and are most plentiful near the coast. The following are the most important species found in this formation : The red iron-wood tree (*Lophira procera*), the Abura (Yoruba name) (*Mitragyne macrophylla*), and the Tombo or Wine Palm (*Raphia vinifera*).

(c) The *Rain or Moist Tropical Evergreen Forests*.—These are confined to the zone of heavy rainfall with showers even in the driest months, and extend in a belt 50 to 100 miles wide along the coast. Some of the most valuable timber trees of the country are found in this type. They are : The Mahoganies, consisting of various species of *Khaya*; the "Scented" Mahoganies, consisting of various species of *Entandrophragma*; the Iroko (*Chlorophora excelsa*); the "Walnut" (*Loroea Klaineana*); the "Cedars" (*Gaurea Thompsonii*) and other species; the "Opepe" (*Sarcocephalus esculentus*); *Mimusops d'Jave*; *Afzelia Africana*; *Saxoglottis gabunensis*; and the Silk Rubber (*Funtumia elastica*) and the Oil Palm (*Elæis guineensis*). The latter species being the valuable economic tree of the West Coast of Africa.

(d) The *Fringing Forests*.—These are similar in character to the rain forests, and are confined to the vicinity of the beds of streams and similar damp situations.

(e) The *Monsoon, or Mixed Deciduous Forests*.—This type is found in the zone where a fairly heavy annual rainfall is followed by a well defined dry season. The majority of the trees composing this formation shed their leaves at that period of the year, but several species of evergreens from the rain forests invade it and occupy the moister areas. The most important trees are : The Yellow Satinwood (*Afrormosia laxiflora*), the Afara (*Terminalia superba*), the Arere (*Triplochiton Johnsonii*, *Piptadenia Africana*); and Mahoganies such as *Khaya anthotica* and *K. PUNCHII*.

(f) *The Savannah, or Open Deciduous Forests*.—This is a park-like formation in which the grasses are dominant. The principal species of trees met with this type are: The valuable Shea Butter Tree (*Butyrospermum Parkii*), the “Dry Zone” Mahogany (*Khaya Senegalensis*), the “Dry Zone” Cedar (*Pseudocedrela Kotschy*); the “Dry Zone” Iron-wood (*Lophira alata*); and the Fan Palm (*Borassus Ethiopica*).

(g) *The Thorn Forests*.—As one proceeds Northwards towards the Sahara, the Savannah forests give place to this formation, which consists mainly of several species of *Acacia*, such as *Acacia verek* (yields a valuable gum), *A. seyal* (yields gum), *A. arabica* and *A. sieberiana*. The acacia forests are replaced by low, thorny scrub just before the sand dunes commence.

PART III.—Area Covered by Existing Forests.

No reliable information can be given under this head as the greater portion of the country has not been accurately surveyed. Roughly speaking, at the present time about 10 per cent. of the total area is covered with rain forest; 2 per cent. by mangrove jungle; 8 per cent. by monsoon forest; 45 per cent. with Savannah Forest or “orchard bush,” whilst 30 per cent. consists of cultivated and fallow lands and the remainder of desert scrub, sand and water.

PART IV.—Most Important Timber and Other Forest Products.

The most valuable timber trees have been referred to in the Summary of Part II. Of other forest products the Palm and Kernal Oils of commerce, which are prepared from the nuts of the Oil Palm, *Elæis guineensis*, are far and away the most important. A small quantity of rubber procured from the tree *Funtumia elastica*, and from species of vines belonging to the genera *Landolphia* and *Clitandra*, is also exported.

PART V.—Ownership of Forests.

Practically all the forests belong to the native tribes and communities owning the land. There is no individual ownership. The Colonial Government has acquired some forest reserves either by gift or by lease under agreement. All forest Reserves are under State (Colonial Government) control. The area reserved is about 1·43 per cent. of the total forest area.

PART VI.—The Relationship of the State to the Forest.

The Forestry Ordinance of 1916 empowers the Governor to (a) appoint forestry officers; (b) constitute certain lands as forest reserves; (c) acquire from any native or native communities by agreement any lands producing or suitable for producing forest produce, or the rights to take forest produce; (d) prohibit certain acts in a forest reserve; and (e) make Regulations to protect and regulate the taking of forest produce both in reserved and unreserved forests, and to provide for the collection, payment and disposal of fees and royalties on forest produce. The Regulations

made under the Ordinance constitute certain timber as protected timber, and this timber may not be taken for sale or export until the prescribed fees and royalties have been paid. Similar regulations control the taking of certain minor forest products.

B. *Fire Protection*.—The burning of vegetation in a forest reserve without taking due precautions to prevent the spread of the fire is an offence under the Forestry Ordinance.

Planting of Waste Areas.—Owing to want of sufficient staff this has not yet been undertaken.

Regeneration of Natural Forests.—Plantations have been made on cut-over and old farm lands and are being extended yearly.

C. Most of the forestry in Nigeria is carried out under either the direct or indirect control of the Colonial Government.

PART VII.—*The Forestry Department.*

The following staff is provided for in the Nigerian Forestry Department: A Director of Forestry, 3 Senior Conservators of Forests; 2 Conservators, 1st grade, 6 Conservators, 2nd grade, 12 Assistant Conservators, and 13 European Foresters.

The native staff consists of 3 Rangers, 15 Assistant Rangers, 24 Foresters, 175 Forest Guards, and 26 pupils.

The functions of the Department are at present confined to administering the provisions of the Forestry Ordinance in the matter of protected trees and protected minor forest produce, the constitution of forest reserves, and to experimental planting. The shortage of staff brought about by the war has considerably interfered with these duties. When complete the establishment will be in a position to undertake working plans, a more detailed inventory of the forests, and the better education of the subordinate staff. Some of the native Administrations maintain forestry establishments of their own, but these are always under the control of the Colonial Government.

The Revenue of the Department for 1919 was £20,780, as against an expenditure of £27,410. In addition to this, £17,563 (inclusive of capital expenditure) was spent on timber extracted by Departmental Agency, the value of which is estimated at £30,000.

PART VIII.

Several companies and some private persons are exploiting timber under exclusive licenses on definite areas. Besides the Public Works Department mills there are only three other saw-mills in the country, the outturn from which is small.

PART IX.—*Professional and other Societies interested in Forestry.*

There are no such societies in Nigeria.

PART X.—*Educational, Research and Experimental Work.*

A Forestry School for training the native staff was started at Zaria in the Northern Provinces, but it had to be closed down during the war for want of European supervision. No facilities have yet been established for research work. Experimental

planting of exotics and indigenous species has been carried out by the Department over 950 acres. The most successful exotics have proved to be Teak (*Tectona grandis*), *Causuarina*, *Cedrela odorata*, and for fuel *Cassia Sianea*. Of the indigenous species the best results have been obtained from *Sarcocephalus esculentus*, *Terminalia superba* and *Erythrophloeum micranthum*.

PART XI.—Annual Increment and Utilization of Home Grown Timber.

A. Except in the case of two small reserves, no estimate of the annual increment has been made. As the majority of the species have as yet no economic value such an estimate is difficult. The most destructive influence is the native farmer, who practises a system of "shifting" cultivation.

B. In the Southern Provinces, where the richest forests are found, the majority of the trees are felled by natives, who convert the stems either into canoes or planks. Table IV in the body of the statement only applies to the Southern Provinces. It shows the annual utilization in *trees* as the check exercised on the fellings is a stumpage one, and no records have been kept of the cubical contents except in the case of timber exploited by Government agency. The figures for which are :—

Year 1917	...	...	...	Output 182,300 cubic feet.
„ 1918	...	...	...	„ 278,491 „ „
„ 1919	...	...	...	„ 325,106 „ „

PART XII.—Forest Industries.

This consists almost entirely of *lumbering*, which is principally confined to the felling of trees such as the Mahoganies, Cedars, African Walnut and Iroko (African Teak) for export. The Forestry Department extracts the timber required for Government use. The number of persons employed on lumbering is not known. No reliable data are available.

PART XIII.—Statistics as to Exports and Imports.

It is impossible to give reliable figures under this heading as the data supplied by the local customs authorities are incomplete and do not furnish in all cases the number of *cubic feet* of timber exported and imported.

A rough approximation of the quantity of timber, in cubic feet, imported annually is given below :—

Year 1912	...	...	547,200 cubic feet, valued at £68,341
„ 1913	...	...	498,300 „ „ „ £60,121
„ 1918	...	...	73,100 „ „ „ £22,687
„ 1919	...	...	109,200 „ „ „ £41,191

The corresponding approximate figures for the exports are :

Year 1912	...	...	1,245,200 cubic feet, valued at £78,167
„ 1913	...	...	1,532,200 „ „ „ £106,471
„ 1918	...	...	68,700 „ „ „ £68,666
„ 1919	...	...	681,300 „ „ „ £117,026

The table attached to Part XIII. gives the figures supplied by the Nigerian Customs Authorities.

Outlook.

A. *The Total Consumption of Home-grown and Imported Timber Compared with the Total Increment.*

As the total increment is unknown, this comparison cannot be made. In past years the consumption of home-grown timber must have been but a small proportion of the annual increment, although the consumption of certain timbers, such as the Mahoganies, Cedars, Iroko or African Teak, and Opepe in the more accessible areas has probably equalled or exceeded the increment of those species.

B. *Probable duration of supplies at normal rate of Cutting and of Growth.*

If the native system of "shifting" cultivation could be curtailed or stopped, the supplies are probably sufficient at the past normal rates of cutting for an indefinite period, but the probability is that the normal rate will, in the near future, be much exceeded, in which case, unless many of the less important and durable timbers are exploited, the supplies of the more valuable kinds will diminish. The growth of some of the latter is fast, *i.e.*, that of Opepe (*Sarcocephalus esculentus*) and Afara (*Terminalia superba*).

C. *Steps which should be taken to Develop the Forest Resources of the Country.*

These requirements are :—

(a) The reservation of much larger areas for timber production. Such reservation, however, cannot be carried out within a reasonable time unless the staff of the Survey Department is strengthened. Meanwhile the forests are being rapidly destroyed. In Nigeria, where a "shifting" method of cultivation is practised and the value of the forests to the majority of the natives is comparatively small, as his requirements in the shape of timber are easily satisfied, it is only by actual reservation that adequate protection can be given to the forests.

(b) An increase of the staff of the Department both European and native. This is required not only for protective purposes, but also with a view to developing the forest resources. At present, the charges held by the European establishment are of enormous extent and more than they can cope with in a satisfactory manner. Such a state of affairs precludes any attempt at research work. In addition to providing one European at least of the higher grade for each of the 21 Provinces (which average 16,000 square miles in extent), the following research officers should be appointed at the very earliest opportunity, *viz.*, One Forest Botanist, one Forest Sylviculturist, and an expert on Forest economic products. Nothing will tend to promote the development of the Forest Resources of the country so much as the appointment of such a research staff. No Botanical survey has been made of this country, and but little is known about the forest products.

(c) The adoption of a generous planting programme for restocking cut-over and cleared areas. Provision should be made

for the annual planting up of at least 500 acres. It will be in connection with this important work that the advice of the expert silviculturist will be so valuable.

(d) An improvement and extension of the road system of the country and the introduction of modern mechanical appliances for the exploitation of the, at present, inaccessible forests. A forest engineer will be required ultimately to develop this branch of Forestry.

(e) The establishment of a good Forestry School for the training of the native staff.

(f) The introduction to the home and local markets of a larger variety of the indigenous timbers. At present comparatively few species are utilised.

GOLD COAST.

The "Gold Coast," which comprises the Colony, Ashanti and the Northern Territories, lies between 1° East and 3° W. Longitude and between the 5th and 11th parallels of N. Latitude.

The area is approximately 80,000 square miles, in 27,000 miles of which dense evergreen and deciduous forests occur, while the remaining 53,000 square miles have the type of vegetation known as Savannah Forests and Savannahs.

The forest regions may be described as undulating with many ranges of hills rising to 2,000 ft. above sea-level. The whole country is drained by four principal rivers and their numerous tributaries.

The rainfall varies between 20-80 inches, the number of rainy days is about 200 in the year, and the average relative humidity in the forest region and on the coast is about 80°.

The State owns no forests as all the land in the country belongs to the natives, either as communities, families, and even individuals. The system of shifting cultivation jeopardises the existence of the forests, but it is calculated that with the present population at least 14,000 square miles of dense forest could be set apart as "reserves" without undue interference with the present native system of agricultural clearings.

A very large number of species of timber tree is found in the country, but so far the *Khayas* and *Entandrophragmas* chiefly are exported to Europe and America under the name of mahogany. The average quantity exported in the last 10 years was over 1½ million cubic feet, and in 1913 over 3 million.

The consumption of timber and fuel is 9½ million cubic feet.

The chief exports of minor forest products are rubber, palm oil and kernels, Kopro and Kola.

The average imports of lumber for the past 10 years was over ½ million cubic feet.

It is estimated that the annual net increment is forty times the annual home consumption.

The forest policy which the Government is prepared to adopt and to continue if successful is the reservation and protection of forests under by-laws passed by the Paramount Chiefs with the advice of the Director of Forests and the approval of Government.

SIERRA LEONE.

Sierra Leone has a coast line of 210 miles, extending between $6^{\circ} 55'$ and 10° North Latitude.

To the N.E. of the Colony is the Protectorate, the extreme depth from N. to S. is about 210 miles, lying between 7° and 10° North Latitude, and the extreme breadth from E. to W. is 180 miles, lying between $10^{\circ} 40'$ and $13^{\circ} 21'$ West Longitude.

Area.—The estimated area of the Colony and Protectorate is 31,000 square miles.

The Peninsula or Colony of Sierra Leone is about 25 miles long and from 10 to 12 miles in breadth at its widest part, and it is one of the few places on the African coast where there is high land near the sea.

A range of volcanic mountains run parallel to the sea from N.N.W. to S.S.E., the highest peaks of which rise from 2,000 to 3,000 ft. The mountains are composed chiefly of syenite and in parts are thickly wooded.

The configuration of the Protectorate varies much in different localities. Away from the rivers the country consists of low rolling downs interspersed with ranges of hills some of which rise to 3,000 ft. The country as a whole is well watered.

Originally Sierra Leone possessed excellent and valuable forests containing practically all the species associated with the other parts of tropical West Africa, but unfortunately many years of unchecked shifting cultivation have caused irreparable damage, and it is doubtful if there are now 1,000 square miles of high forest left. The result of this constant destruction has become very marked and serious; climatic conditions are changing and the natives are finding that they have now to clear considerably larger areas of land than formerly to procure a smaller amount of food. The natural sequence is that the secondary bush can no longer be left to grow to a size which can be of use to the soil; grass is rapidly creeping in and bush fires rage and spread for considerable distances in the low undergrowth, thus assisting and increasing the damage already done by human agency.

Legislation.—A Forest Ordinance was passed in 1912 providing for—

- (a) The constitution of Reserves in the Colony and Protectorate.
- (b) The constitution of Restricted Areas in the Colony and Protectorate.
- (c) Rules to regulate the collection of Forest Produce such as Gum Copal and Rubber.
- (d) Rules to regulate the cutting of Timber in Reserves and Restricted Areas.
- (e) Special Rules relating to Forest Reserves.

During last year further rules relating to the tapping of gum copal were passed by the Legislative Council.

The Ordinance provides that reserves and restricted areas can only be created in the Protectorate at the request of the Tribal Authorities.

Three reserves are at present in existence, namely, the Colonial or Peninsula Reserve in the Colony, covering approximately 75 square miles; the Kambui Hills Reserve covering approximately 52 square miles; the Kessewa Hills Gum Copal Reserve (*Copaifera Guibourtiana*), covering approximately 7 square miles. The total reserved area is therefore at present 134 square miles, and there are in parts considerable quantities of valuable timber trees.

Re-afforestation work on a small scale has lately been begun on some of the bare hillsides in the reserves.

The demarcation of a further area is at present proceeding in the Nimmini Hills, but destruction by farmers proceeds more rapidly than the boundary cutting can be performed by the small forest staff, and where it was originally intended to form one large reserve it has now become necessary to make four smaller ones.

Bush Fires.—It has not been possible up to now to take steps to check bush fires.

Forest Authority.—The Forest Staff consists of a Conservator of Forests, one Senior Assistant Conservator of Forests and two Assistant Conservators.

The native subordinate staff consists of 2 first-class rangers, 4 second-class rangers, 5 foresters, 33 forest guards, 9 nurserymen.

The total personal emoluments amount to £3,294, and other charges, including £1,360 for labour, total £2,986.

No timber is exported from Sierra Leone. During the war mangrove wood was used by the railway for fuel purposes and sleepers; this is still being done.

The Public Works Department buy considerable quantities of native-sawn boards on which there is unavoidable waste owing to uneven sawing. Given staff and suitable hauling machinery, timber in the log might be supplied to the Railway and Public Works Department and a considerable saving effected thereby. In 1913, lumber to the value of £22,355 was imported into Sierra Leone for the use of the above Departments and local builders.

BRITISH EAST AFRICA, UGANDA, TANGANYIKA AND NYASALAND.

Mr. EDWARD BATTISCOMBE, Conservator of Forests (East African Protectorate): Lord Lovat, and Gentlemen, I have been instructed to represent the four Colonies of British East Africa, Uganda, Tanganyika territory (formerly known as German East Africa) and Nyasaland. No report has been prepared for Tanganyika; a Conservator of Forests has only just been appointed and no documentary information has been brought to light yet on which to compile an estimate of the areas of forests or their potentialities. Suffice it to say that the former administration

maintained a well-staffed Forestry Department, whose policy was strict conservation and regulation of exploitation. A fairly comprehensive Forest Ordinance was in existence and this, with some few amendments, it is hoped will be adopted by the new administration.

The four Colonies on the Eastern side of the Continent form a compact group lying between the Indian Ocean, and about longitude 30 East and between parallels 5 North and about 16 South. They are characterized by high plateau lands suitable for European colonisation, and these high lands are capable of producing such valuable products as hemp, coffee, flax, tobacco, &c. The greater parts of the forests are situated in the highlands; there are also large areas of mangrove swamps on the seaboard of British East Africa and Tanganyika. These mangrove swamps are very important and bring in very large revenue, the bark being exported to Europe and America, and poles to the Persian Gulf.

The climate of the Colonies, except in the extreme South is essentially equatorial; there are no well defined seasons of summer and winter, and there are two seasons of rain in the year, not one as occurs further North.

Details of the estimated areas of forests of British East Africa, Uganda and Nyasaland will be found in the reports. It will be noted that the percentage of land covered by forest is extremely small; in British East Africa 2 per cent.; in Uganda 76 per cent., and Tanganyika territory—for which we have no figures—probably the percentage is much smaller on account of it being a very much larger country.

In Nyasaland the actual area of forest land is 3,000 square miles against a total area of 46,000 square miles. In all the Colonies there are areas covered by bush, trees of which do not attain timber dimensions, but it is probable that they attain valuable forest products such as gums, resins, tan-bark, &c., &c. The areas of the bush have not been included in the figures for the forests.

The most important timber trees, as far as is at present known, are the East African pencil Cedar, which is found in British East Africa, in Uganda and in Tanganyika territory in the Usambara Hills. This timber is already being imported into India and small quantities into the United Kingdom, and America is making enquiries. The cedar is absent from Nyasaland but its place is taken by the so-called M'lanji cedar. *Podocarpus* is the only other coniferous timber to be found in the four Colonies. There are very many other hard woods, but I refrain from mentioning these as they are known by the native names.

The ownership of all the forests is vested in the Crown. In East Africa certain areas are classed as native reserve forests, but in so far as their management is concerned that is controlled by the Government. In Tanganyika territory the Germans have exploited a certain amount of forest, and I believe it is the hope of the new administration to follow the same line.

All Departments, except that of Nyasaland, which is a branch of the Agricultural Department, are independent. They are

composed of staffs of very varying qualifications. It is hoped that when the subject of the "Forest Authority" is being discussed by the delegates the question of the establishment of a Central Forest Authority will receive careful consideration.

The general policies of the Departments are the same, namely : conservation, exploitation and regeneration. It is worthy of remark that the former German administration do not appear to have paid any attention to the regeneration of their forests.

There is a crying need for research and exploration. Practically nothing is known about the trees composing the forests. In East Africa the Forestry Department was started 18 years ago; we know very little about our timbers; we are learning a certain amount, but of intimate, accurate knowledge we have none at all. We cannot give you actual figures for the resistance to strain, &c., &c., simply for the reason that we have had no research, and that, I think, applies to all the African Colonies on the East Coast.

My Lord, I have the pleasure to hand you the three reports of East Africa, Nyasaland and Uganda.

FEDERATED MALAY STATES.

Mr. G. E. S. CUBITT (Conservator of Forests, Federated Malay States and Straits Settlements).

Lord Lovat and Gentlemen: I have had some little difficulty in preparing this statement because of the number of administrations that there are in the Malay Peninsula; there are six of them; what I say will apply generally to the whole of the Malay Peninsula, which is rather smaller than England, but more particularly to the Federated Malay States and Straits Settlements, where there is a properly organised Forest Department.

It might be imagined from the nearness of the Malay Peninsula to the Equator that we live in a torrid heat. As a matter of fact the climate is always warm, but never very hot; and it is never cold; also rain falls every month and the result of these conditions is that all our forests are evergreen.

In this statement of mine I have endeavoured to sub-divide the forests in some detail, but I only mention two classes now, the Mangrove Swamp Forests and the Inland Forests below a level of 2,000 feet. The Mangrove Forests are comparatively small in extent, but I believe I am right in saying they are more fully exploited than any of the Mangrove Forests in any part of the British Empire. On the existence of these forests largely depends the existence of the tin mines. They are also at present, owing to the difficulty of getting coal, very essential to the Railways.

The inland forests below 2,000 feet elevation are largely composed of Dipterocarps. It may be of interest to mention that the number of species of Dipterocarps in the Malay Peninsula, including 12 species believed to be new and not yet described, is certainly 99, and probably more than 100. These Dipterocarps contain species of timber of all degrees of hardness so that from the

Dipterocarps alone we obtain timber which can be used in the same way as the deals of Europe and the Sál of India.

Less than 100 years ago, I suppose I am right in saying, the whole of the Malay Peninsula was covered with forests of some sort or other. The position now has changed. Taking the Peninsula as a whole, two-thirds of the country are covered with forests and it is probable—the figures for the un-Federated States are rough—that for the Malay Peninsula as a whole two-fifths of the forests may be considered merchantable.

We have reserved 10 per cent. of the total area of the Federated Malay States and we do not intend to stop anything short of 25 per cent.; in fact, I have suggested 30 per cent., to the Government, a higher minimum.

It is impossible for me to give a list of all the timbers that exist in the Federated Malay States. We have nothing that will compare with the teak of India in general utility, but we probably have in the Malay Peninsula a greater number of commercial timbers than exists in any area of equal size in India, and the quality of some of these timbers is extremely high.

I should like to mention just one minor product—Gutta Percha. It may not be generally known that the Gutta Percha of the world comes from the Malay regions, also that most of the Gutta Percha which has been obtained in the past has been obtained by native methods which involved the cutting down of Gutta Percha trees. The result of this method of work has been that a great part of the Gutta Percha has been destroyed. The Dutch were the first to recognise this, and have started plantations in Java, and the British Government have been dependent on the Dutch for the Gutta Percha which is necessary in the construction of submarine cables. It may be of interest to the Conference to know that Gutta Percha is now being cultivated by private enterprise in the Malay Peninsula, and there is every reason to hope that in 10 or 15 years the British Empire will be more nearly able to support itself in the matter of Gutta Percha than before.

The whole of the forests in the Malay Peninsula are owned by the State except such small areas of forests as may have been alienated for rubber planting or for tin mining.

As regards the relationship of the State to the forests, I need only mention that the laws in force in the Malay Peninsula very closely follow those in force in India, but in a simplified form. The organisation of the Forest Department also follows closely Indian lines—no doubt owing to the fact that 20 years ago the Forest Department of the Federated Malay States was organised by an officer in the Indian Forest Department. The staff is much too small, but a large increase, I have no doubt, will be sanctioned. The powers and duties of the various officers are similar to those in India.

The income and expenditure will sound very small when compared with the figures given by delegates from India, but the

revenue—and what is more important, the surpluses—are continually increasing without a reduction in the expenditure, and I think we may hope that the surplus in the Federated Malay States alone—the un-Federated Malay States do not come in at present—will never be much less than half a million dollars per annum.

As regards education and research work, the Government of the Federated Malay States are fully alive to the necessity of education both for the locally recruited staff and for the rangers, and as soon as it is possible a vernacular school will be established. A difficulty arises in the case of the Executive establishment, but it seems probable a solution of that difficulty is to join hands with Sarawak and British North Borneo and establish a central school for training English-speaking Malays and others for recruitment to Borneo and Sarawak as well as the Malay Peninsula.

We have begun in a small way research work, and I should like to pay a tribute here to the distinguished American who is now responsible for research work in the Malay Peninsula—Dr. Foxworthy—who was for many years Head of the Forest Education and Research Branch in the Philippines. The result of his appointment—which I hope will become permanent—is that we really know now something about our commercial timbers.

What will perhaps interest the Conference more than anything else is what the Malay Peninsula can do for the British Empire outside the Malay Peninsula. I regret that I cannot give a very rosy report. The timber is badly distributed; the more developed States are suffering from a shortage, and the others have more timber than they require. A lot of timber was wasted in the rubber plantations, of which in the Federated Malay States there are at least 1,000,000 acres. It is estimated that in these plantations at least 50,000,000 tons of timber were burnt, which, I have estimated, would represent a stack 5 feet high, $2\frac{1}{2}$ feet thick and 36,000 miles long. I am not prepared to say that that was altogether wrong. Tin and Rubber did not win the war, but they helped to win it, and unless there had been fairly lenient rules in the matter of destruction of timber, it is quite evident we should not be in the position we are now with regard to Rubber and Tin. Moreover, the Government is determined to alienate more land in which the process of destruction will be repeated, but the Government is alive to the necessity for proceeding carefully, and when I left the country steps were being taken to devise some system by which the waste should be at any rate reduced.

To sum up, we can look to the Federated Malay States for no timber for use outside the Federated Malay States. The utilisation of wood of all kinds in the Malay Peninsula is, from such information as I have been able to obtain, greater per capita than in any country in the world outside the United States.

As regards forest industries, there are practically none, except lumbering. A match factory is being erected in Selangor, and shortly the Malay Peninsula will produce its own acetic acid. A large amount of timber is imported into Singapore for conversion

at the saw mills, and much of it is subsequently exported. We shall have to be extremely careful in the use of our timber, and the Government is fully alive to the vital necessity of preserving its forests, with due regard to development in other directions. It is endeavouring to find means by which the consumption of timber can be economised and by which supplies can be maintained and increased, and is fully in favour of an extensive reservation policy.

BRITISH GUIANA, BRITISH HONDURAS AND THE WEST INDIAN ISLANDS.

Mr. C. S. ROGERS (Conservator of Forests, Trinidad and Tobago): My Lord and Gentlemen, I have been asked to represent British Guiana, British Honduras as well as Trinidad and other West Indian islands, and that includes the Bahamas and Bermuda. Of course, Bermuda does not really belong to the West Indies, but it has been grouped with them for convenience.

BRITISH GUIANA.

I will begin with British Guiana. The area of the Colony is about 90,400 square miles. Of this 78,680 square miles, or 87 per cent., is covered with forest. Of the forest area 13,000 square miles, or 11·5 per cent., contains merchantable timber that is accessible. 77,780 square miles belong to the State. Leases or licences are granted for periods of one to five years and are renewable. The annual rent for the first 2,000 acres is $2\frac{1}{2}d.$ per acre, and $\frac{1}{2}d.$ per acre for additional areas. A security of \$5,000, or £1,041 15s. 4d., must be deposited. In addition to the rent, a royalty of $1\frac{1}{2}d.$ per cubic foot for "Greenheart" and 1d. per cubic foot for other valuable hardwoods is payable; $\frac{1}{2}d.$ per cubic foot for softwoods and $2\frac{1}{2}d.$ per cubic foot for sawn timber. Tracts leased must be worked to the satisfaction of the Government. The minimum limit of size of trees to be cut is trees to square 10 inches.

At present there are 402 licences in existence covering 575 square miles, or 5 per cent. of the easily accessible forests. Timber for export is extracted by water, the lighter woods are floated singly or in rafts and the heavier woods by the aid of punts.

The annual utilisation of timber is valued at £65,000 in the forest, of which "Greenheart" accounts for £50,000; to this must be added £180,422 as the value of Balata gum, making a total value of £245,704.

In normal years 75 per cent. of the timber and gum goes to the United Kingdom and the remainder to the United States of America and to Canada, South America and the West Indies.

The coastal forests are accessible by river for a distance of from 35 to 110 miles. Besides "Greenheart" there are a number of hardwoods and timbers of lighter weight that could be

utilised if a market for them could be found. Among these Wallaba (*Eperua falcata*) has been used for telegraph poles and for shingles.

No forests have as yet been set aside as forest reserves for the production of timber and no systematic forestry has been undertaken. Great benefit would accrue to the Colony and to the Empire if systematic forestry was undertaken.

The climate is tropical and the forests are for the most part dense evergreen. Water-power could be made available from falls and rapids in the rivers.

BRITISH HONDURAS.

The Colony has an area of 8,000 square miles and is situated in Central America on the Atlantic coast. The climate is tropical. About 4,000 square miles are under forest and is almost entirely owned by the State.

The area that produces mahogany and cedar is estimated at 3,500 square miles; and in addition to this 2,600 square miles is under pine, containing, it is estimated, over 40 million trees. The pine wood is very resinous and will not float. It has been suggested that it might be used for the production of resin and turpentine; not more than 15 per cent. of the area is accessible at present.

During 1916-18 an average of about four million board feet of mahogany a year was exported. This was all bought by the British Admiralty. The timber was sent in logs to the United States of America for conversion. In 1919 four million board feet exported was valued at £100,000. In addition to mahogany, 500,000 to 800,000 board feet of cedar was exported, mostly to the United States of America.

So far, no areas have been set aside as forest reserves, and no systematic management on silvicultural lines has been undertaken. It would undoubtedly be of great advantage to the Colony if systematic management could be introduced in order to secure a permanent supply of mahogany for use within the Empire.

TRINIDAD AND TOBAGO.

The Colony comprises the islands of Trinidad and Tobago, having an area of 1,861 square miles, situated close to the north coast of South America. Trinidad is the southernmost of the Caribbean Islands, and Tobago, 131 square miles, lies about 35 miles north-east of Trinidad. The climate is tropical, being within 10 degrees of the Equator. The total area of the Colony is about 1,990 square miles.

330 square miles have been set aside as forest reserves, and there is a further 1,000 square miles of land covered with forest that is to be sold for agricultural purposes. On this area the standing timber is given with the land. Land in parcels of less than 100

acres is sold at £2 10s. an acre; in excess of 100 acres the price is £5 an acre; an undertaking has to be given that the land will be cultivated.

Of the forest reserves, about 90 square miles are on inaccessibly hilly land; the remaining 240 square miles is flat or undulating.

The only timber exported in any appreciable quantity is the cigar-box cedar (*Cedrela odorata*), and the supply of this is diminishing, and will continue to diminish, until supplies become available from the plantations in 40 to 50 years' time. Before the war exports of cedar varied in value from 10 to 57 thousand pounds and most of it went to Germany.

Besides cedar, hardwoods to the extent of over 1,000 tons a year are available if means of transport can be found, one of the most important of these woods is the valuable dyewood, Fustic (*Maclura tinctoria*), of which a total of 20,000 tons is available, Crabwood or Crappo (*Carapa Guianensis*) is also available in considerable quantities. This wood resembles a coarse grained mahogany. There is also a considerable quantity of other hardwood of heavy and medium weight. There are about 30 square miles of Mora forest (*Mora excelsa*), for which a market is required.

The import value of coniferous wood from the United States of America and British North America is £80,000. Most of it comes from the United States of America.

Forestry was begun about 20 years ago, and 800 acres of plantation have been made. Improvement fellings were begun three years ago. 1,200 acres are being done annually. Teak was introduced from Burma in 1913 and is doing very well. In about 80 years 15,000 tons a year will be available. At present most of the wood cut is used locally.

THE BAHAMAS.

The Colony consists of a large number of islands that stretch from Florida to Cuba. There are 18 principal islands or groups of islands. All are of coral formation. The climate is sub-tropical. The total area of the islands is about 2,800 square miles. The area of forest land owned by the State is 370 square miles, or less than 13 per cent. of the Colony. The principal timber is yellow pine, *Pinus Bahamensis*. The rights to cut pine timber are leased to a private company. The cut from 1907 to 1913 was six million feet. Part of this was used in the Colony and part was exported to Cuba. The company ceased work from 1913 to 1919 when work was re-started on a reduced scale.

From 1907 to 1913, exports were valued at £17,248 and imports at £5,086. From 1914 to 1919, the figures were £16,000 for exports and £8,206 for imports. The excess value of exports for the 13 years amounted to £20,000.

No areas have been set aside as forest reserves for the production of timber and there is no Forest Department.

BERMUDA.

The area of the Colony is $19\frac{1}{4}$ square miles, the formation is coral. No real forests exist. Bermuda Cedar is grown and used locally in building construction and for boats. Imports of coniferous wood from the United States of America and from Canada are valued at £24,000, of which two-thirds come from the United States of America. There is no forest department.

CYPRUS, RHODESIA, LEEWARD ISLANDS AND
WEI-HAI-WEI.

Mr. W. D. ELLIS, C.M.G., M.A. (Colonial Office) : My Lord and Gentlemen, the only report, I am sorry to say, which has come to us is the report from Cyprus, so I am afraid the others will have to be laid in dummy, to use a Parliamentary expression.

I will make a few remarks on Cyprus. I am very sorry the author of the report, Mr. Bovill, the Principal Forestry Officer of Cyprus, is not here. If he were here he would be able to present the report much better than I can. I may say what a very valuable officer he has been to Cyprus.

Cyprus, though actually an island, is so close to the land that it is practically continental as regards its climate; it almost lies in that desert belt that stretches round the world. The rainfall in the plains is 14 inches on an average in a year which, as you all know, in a hot climate is on the verge of desert conditions. When we took over the island 40 years ago desert conditions were almost supervening in many parts. I heard for the first time this morning—I think from you, my Lord—that the Turks were before us in setting up a Forest administration. They had not set up one in Cyprus when we got there and things were in a very wretched state indeed. One of the first things we did was to take advice as to what we were to do, necessarily not from an Englishman but from a Frenchman, Monsieur Madon, who furnished a report on the subject in 1881.

Really on a small scale I should say, the results following his report and the subsequent labours of Mr. Bovill have been a model, because now our annual increment practically satisfies the wants of the island. We only use 190,000 cubic feet of matured timber per annum, and we have 74 years' supply in sight. We prohibit the export, except under special circumstances. When the War came Cyprus was able to supply very largely the needs of our armies in Egypt and Macedonia for timber and charcoal, without making any serious inroads on its forest capital.

We have our enemies; we are plagued with goats which are the great enemies of forests. We do our best to discourage the number of goats. I had a great idea at the beginning of the War. When they brought the Indian troops over they wanted goats meat, so I am told. At the same time Cyprus said they would like to contribute something for the benefit of the army. I said : " For goodness sake send your goats." I will not detain you any longer. I have the honour to present the report on

Cyprus and the dummy reports on Rhodesia, the Leeward islands and Wei-hai-wei.

THE CHAIRMAN : Gentlemen, that concludes the business of the meeting, and I am sure that all of you will agree with me that we have had most interesting statements from the various Dominions overseas. I am sure that in every single report that was presented, and the speeches made in presenting them, there were facts that many of us did not know and certainly things which were worth while taking notes about. I think having all these together in a body constitutes a good working basis on which we can carry on our future investigations.

SECOND DAY.—Monday, 12th July, 1920.

(Held at the Surveyor's Institute, 12, Great George St., Westminster.)

On the motion of Mr. Mackay, seconded by Sir Claude Hill, Lord Lovat was moved to the Chair.

The following rules of procedure were agreed to :

- (1) That the ruling of the Chairman be final upon all points of procedure.
- (2) That the Chairman have power to limit the duration of speeches.
- (3) That preference in addressing the Conference be given to Delegates, and
- (4) That Delegates and Associate Delegates be asked to intimate to the Chairman their desire to speak before or during the discussion.
- (5) That the right to vote on resolutions be confined to Delegates, each Delegate being given one vote, and
- (6) That no resolutions covering matters of policy be submitted while the Conference is sitting in Committee.

The Chairman explained with regard to rule No. 6 that any resolutions could be handed in, but the actual wording of resolutions would be referred to the Drafting Committee.

It was also suggested that this and all other Committees that might be set up should consist of a member from the United Kingdom, a member from India, and from one to three members from the Dominions (depending on the extent to which the Dominions might be interested in the subject), and one member from the Crown Colonies. That is to say, not less than four, nor more than six members in all with powers to co-opt.

This was agreed to.

The Chairman added that it had been suggested (1) that a statement be given to the Press every day (2) that Delegates and Associate Delegates have an opportunity of correcting their remarks in the room upstairs as soon as they are typewritten, and (3) that a Committee be appointed to make a précis of the speeches of the Delegates and Associate Delegates for inclusion in the official report of the Conference which official report will include (a) the Statements from the various parts of the Empire ;

(b) the work at the Conference; (c) the reports of the Sub-Committees; (d) the Resolutions passed by the Conference.

This was agreed to.

RESPONSIBILITY OF THE STATE FOR FOREST POLICY.

Mr. P. H. CLUTTERBUCK read a paper as follows :

India probably furnishes a better example than any other portion of the British Empire of the beneficial results of State action in relation to forestry. In that Dependency, as in certain other parts of the Empire, the spread of civilisation has been marked by the indiscriminate destruction of valuable tracts of forest. The reason is not far to seek. Britain has long been content to rely on foreign imports for the bulk of her timber requirements, and such forests as she possesses have in large measure been maintained primarily for purposes of sport, economic working being too frequently relegated to the background. It is not surprising, therefore, that our various administrators, educated in such an atmosphere, should have failed in the past to realise the great potential value of forest lands, and the necessity for conserving a due proportion of them and working them on scientific lines.

The earlier days of the British occupation of India furnished an example. During the period of prosperity which followed our occupation, and with the increase of population and the spread of agriculture the destruction of the forests began to assume a serious aspect. In the first half of last century desultory attempts were made to check the depletion of the forests, and officers were appointed from time to time to inspect and report on them. It was not until 1855, however, during the viceroyalty of Lord Dalhousie, that a definite and far-sighted forest policy was laid down. This policy was prompted by a report submitted by Dr. McClelland, after an extended tour in the province of Pegu shortly after its annexation in 1852, in which attention was drawn to the necessity of saving the valuable teak forests of that province from destruction. As a result of this enunciation of a definite forest policy, the first trained forest officer, Dr. Brandis, was appointed to be Superintendent of Forests in Pegu in 1856. Brandis's appointment marks the dawn of scientific forestry in India and the first step towards the establishment of a service of professionally trained forest officers and of a regular Forest Department.

The earlier years of the Forest Department were marked by a constant struggle against opposition of all kinds, not only from traders whose pockets were affected by restrictions against the wholesale depletion of the forests, but also in some cases from civil officials who failed to realise the great potential value of the forests and to understand the aims of the Forest Department. The breaking down of this opposition was a gradual process entailing many years of uphill work, but the forest officer of to-day has the satisfaction of knowing not only that his Department has

laid the foundation for the development of a vast property of immense value, but also that its value is now generally appreciated by the Civil Administration. For whereas at one time it was impossible to obtain funds even for the barest necessities, at the present day expenditure on forest development is looked on as a highly profitable investment on the part of Government, and no reasonable scheme of expenditure is now vetoed.

Looked at from the financial point of view alone, the results attained by the systematic management and development of the State forests in India have been remarkable. During the last quinquennial period before the war the average annual net surplus was nearly ten times what it was during the quinquennial period 1864-5 to 1868-9, and the intervening periods have shown a steady rise. The average annual net surplus for the last quinquennial period before the war amounted to Rs. 132·3 lakhs, which at the present gold value of the rupee is equivalent to £1,323,000; in addition to this, forest produce to the value of nearly half this sum was given away free or removed by rightholders. These figures, although they represent but a small fraction of what the State forests of India will ultimately produce when they are worked up to their full capacity, will give some idea of what can be accomplished by a rational State forest policy.

The legal control of State forests in India is based on various enactments, of which the chief is the Indian Forest Act, which has well stood the test of time and might be a useful guide in countries where conditions in any way approximate to those prevailing in India. One of the most important provisions of this Act is that which gives power to constitute reserved forests—that is, forests in which all rights are ascertained and recorded or extinguished at a formal settlement; these forests are then demarcated and afterwards brought under systematic management. Continuity of management is secured by the fact that no reserved forest can be deforested without the most careful scrutiny and the most valid reasons.

As regards the reservation of forests, it must be noted that India is in a specially favourable position in that the greater part of the land has, from time immemorial, been owned by the State. Thus the conditions there virtually amount to the nationalisation of the forest lands. This places the forest officer in India in a specially advantageous position, since rights can be settled and recorded in a manner which would not be possible in countries where the system of land tenure is not so favourable.

The extent to which the State should undertake the exploitation of its forests and the marketing of the produce is a question which can be decided only after a consideration of local factors. In India much of the exploitation is done by lessees or purchasers, but on the other hand it is often found advantageous for the State to undertake the extraction and marketing of forest produce itself. In Burma both systems are in force for teak timber, but Government extraction in this case is found to be more profitable than the handing over of forests to lessees. The resin industry in the Himalayas is a State monopoly, and a very profitable one. Government is now devoting much attention to the utilisation of

timbers hitherto little known, and in the United Provinces a large State wood-working institution is in process of development.

In the Andamans a State saw-mill has been in operation for many years, and in Burma it is proposed to extend considerably the conversion of timber in State saw-mills. Only by such means has it been found possible to bring to the notice of consumers the many excellent but little-known timbers yielded by the forests of India, for there is always a risk in bringing a new product on to the market, and private enterprise is not always willing to incur such a risk except on terms very disadvantageous to the State.

In conclusion, it may be said that but for State action in India extensive tracts of valuable forest would have been converted into worthless waste land, and in place of a forest property of almost unlimited potential value we should now possess nothing but the degraded remnants of what was once a magnificent heritage.

The CHAIRMAN : I would like, in the name of the Conference, to thank Mr. Clutterbuck for his opening statement.

Mr. ELLWOOD WILSON (Chief Forester, Laurentide Paper Company, Quebec) : The question of the responsibility of the State for Forest Policy is a very important question indeed, especially in the countries which are self-governing. In speaking of this question there are two points of view in regard to what constitutes the State. Technically, of course, the State is the Government, but in the broader sense the State really consists of the Government and the people, the State being based entirely on the vote and on the confidence which the people have in it.

Now, as forest resources are absolutely bound up with the life of a nation, no nation being able to exist or prosper without wood in sufficient quantity, it is absolutely essential that the people of a country should be thoroughly informed with regard to their forest resources, and with regard to the methods of handling and perpetuating these resources so that they may be used to the best advantage of the whole country. The responsibility of the State for forest policy arises primarily out of the necessity of continuity of policy. Investments in forests and forest management require such long times before they can come to any fruition that it is absolutely necessary that some body, which shall have like continuity, should be charged with the policy, therefore, it is distinctly the responsibility of the State to see that the forests are properly handled.

In the self-governing Dominions the difficulty of carrying out any policy, however, through varying changes of Ministries, and very often of the personnel under them, makes it necessary that education, along forestry lines, should be very widely disseminated, and that the man in the street and the farmer, everyone who is interested at all in national welfare, should be thoroughly informed and be kept informed so that he can feel the responsibility for his own vote in regard to these matters. It is absolutely essential that some method of publicity should be adopted in all countries which are careful of their forest policy, so that a civic consciousness

may be aroused and maintained to help the officers that are charged with forest policy and with forest Government.

There are two points of view which are taken by forest authority in different sections of the country, in different parts of the world. One is that once being charged with the forest authority, a Government Department has no further responsibility to the people in a way. Government Departments, charged with forestry matters, very often become careless of the opinion of the people, and insist on carrying out their policies entirely as they will, having nobody to over-see them, and to keep them up to their work. They are apt to become tutorial, and to lapse into indifference in regard to progress. This is no new thing in forestry; it occurs in Government Departments the world over, and is one of the unfortunate features of a democratic Government. Hence, the necessity for an educated public opinion, not only to initiate and to carry out a forestry policy, but also to see that the officers charged with the care of the forests should be kept up to their work.

The other point of view is that of a forest authority endeavouring to co-operate with the people who are operating the lands either under license from the Government or who are operating their lands which they hold in fee simple. The question in the United States at present has come to a very acute stage in that the Government begins to feel that they must, in order to save and perpetuate the forest resources of that country, take such steps as have already been taken in Sweden to control the cut and the exploitation on privately owned lands. This is a step which is very much in advance of any thing which has been done before. It is not Nationalisation, it is more the claim on the part of the State to have the right to see that a man does not misuse his own private property.

In some of the provinces in Canada this more liberal policy has been pursued, that is endeavouring to co-operate, not only with licensees of Crown lands, but also with men who own their lands in fee simple. This policy has been carried to quite an extent in British Columbia, New Brunswick and Quebec, but the joint commissions of private individuals interested in lumbering and Government officials practically control the policy of the Government. This, to my mind, is by all odds the best way of handling this question of forestry policy. Where a Government steps in and says to a private owner "You must do this or you must do that," there is a feeling of coercion which is resented by free men and it is very much better that the policy should be that of co-operating and asking a man what his opinion is, of educating him up to the point where he feels that his property is only his property in trust for the good of the whole State and for the good of the Nation, and that, therefore, he should properly care for and administer that property. It seems to me that is a far better way of exercising the responsibility of the State than the idea where the State takes the whole charge and insists on carrying out this policy by force or by legislation.

This again brings us back to the point which I made a moment before that Education is the basis of reform and is the basis of all

progress, not only the education of the man who is strictly charged with the administration of forestry work, not only the education of the man who owns forest lands, but also the education of men in all walks of life, bankers, lawyers, physicians, farmers and all the other classes of trades and professions. If men are properly educated; if these questions are brought home to them in a proper light, they almost invariably react well and favourably, and progress along all lines of Government activity.

Now this Conference will have a wonderful effect in carrying back to the various Dominions and Crown Colonies the idea that they have thoroughly examined this question of the protection of forest resources, and their care and management all over the world. The results of these Conferences will be a help and an incentive to the men who are already working, and the delegates will be able to go back to their several countries bearing the cachet of Imperial approval, and I think this Conference marks one of the greatest steps in the advance of forestry all over the world that we have ever seen, and I sincerely hope that its labours may be crowned with the greatest success.

SIR WILLIAM SCHLICH: We had an exposition by Mr. Clutterbuck of the example which I may say India has set to the British Empire in developing forestry on systematic lines based on scientific principles, and I may also just draw attention to the fact that this example which India has just set during the last 60 or 70 years has induced many of the other parts of the Empire, especially in the earlier days, to ask for the help of officers who were acquainted with the measures taken in India so as to see how far they could be applied to other parts of the Empire. From India we have sent men to the Federated Malay States and to New Zealand many years ago, even to Australia, to South Africa, to the West Indies, to the Sudan, to Cyprus, in fact, to any part of the British Empire, and even in this country we have a number of Indian Forestry Officers who have taken a position.

The difficulty which our Indian Forest Officers have had is that in most of the other parts of the Empire the Government has not the same control over the land which we have had in India, and therefore they had to fight with very much greater difficulties than we had in India.

But whatever the Government of a country may be it has a responsibility to see that a country is supplied with a sufficient quantity of forest produce and now here comes in, of course, the great question, on which Mr. Wilson has touched, of State forests and private forests. Of course, if we go strictly by democratic principles, we should say that the whole thing should be thrown open to private enterprise, but as has also been pointed out there are certain conditions connected with the forest industry which, after all, is an industry based upon science, namely, that it takes long years before a return can be derived from forests, and that we must provide produce in approximately even quantities year after year.

It is now fully recognised that in order to secure ourselves against a scarcity or even a famine of timber a certain portion of the area of the forest must be kept in the hands of the State. We have tried it in various other ways, through private agency, and wherever it has been tried it has failed, therefore, a certain proportion, according to the local conditions of the forest area must be held by the State as giving the only lasting guarantee for continuity. I said that the State must make sure that the necessary quantity of produce is provided, but who is to determine that? The only authority in any country that can decide that in reality is the State itself, and therefore it is absolutely necessary that the State should take certain action, partly in limiting the action of the private individual, and partly in furthering the interests of the proprietors of forests. Therefore, the State must pass forest laws to lay down certain lines which ought to be applied to the forestry business, because the State alone can determine what areas are required or, at any rate, estimate what areas are necessary to provide a country with the proper produce.

India, I think, has set an example in that way. We have an Indian Forest law which has now been in force since the year 1878. It determines what areas shall be under the operations of the law. It gives the power to select or acquire the necessary areas to be converted into permanent State forests. It provides for the determination of all rights in those areas before they are declared State forests, and makes regulations which should be observed in the utilisation of these forests, and last but not least, it provides for the formation of a fixed and sufficient staff to manage the areas which have been declared State forests or acquired as State forests.

In India, we have already declared under this Act something about 100,000 square miles of permanent State forests, which probably will be increased by another 50,000. Perhaps out of 250,000 square mile of forest which we have in British India, 150,000 will be permanent State forests. That will suffice to make India for the future, just as the Forestry Commissioners in this country are now on the way to make this country, safe against any emergency.

Every part of the Empire ought to do the same thing. Of course, there are difficulties. I was sitting the other day next to a high official of the Dominion of Canada; I got into conversation with him and he said "It is all very well but we cannot make these reserve forests because our people will go and settle in the middle of them, and are we to cut them out again afterwards?" That is rather begging the question. The thing is to select areas and to declare them a reserve forest and not allow the people to go inside. Unless that is done the reservation has no meaning. Canada is, of course, of particular importance to this country as on it will depend probably in the future the permanent supply of coniferous timber to the world. We have in Canada, for example, something like 900,000 square miles

of forest, of which 350,000 square miles are considered timber forest, the other being used more for local consumption. Now, I say, that if Canada or the different provinces of Canada would set to work at once and select one-ninth of the forest area, or 100,000 square miles, by degrees and declare them a permanent forest estate, after taking into consideration all agricultural requirements they would secure for themselves and for us, too, 64,000,000 loads of coniferous timber. That would be quite enough for all parts of the earth. To proceed to select the permanent State Forest is the first and foremost duty of a Government with regard to forestry.

Mr. BATTISCOMBE: In British East Africa the absence of a continued forest policy renders the position difficult to deal with and it is due in the main to three causes. One is the apathy of the Government; the second is the antagonism of the settlers (white settlers), and the third is lack of propaganda. All those three really hinge together. The Government is intensely busy; their whole idea is to develop the country and forge ahead; for that they must give out as much land as they possibly can and if there is a piece of forest and the settlers see the forest there, they cannot understand why they should not have the forest, cut it down and do what they like with it. If we had a staff of educated forest officers in the country they would meet the settlers and various Government officials, and they would discuss various questions with them and no doubt both the settlers and the Government officials would come to appreciate the arguments in favour of forestry.

At the present moment we are in exactly the same state as India was when in 1855 Mr. Brandis was first sent out there, but we are now able to hold up the example of India to our Local Government. There is a Forest Act and, under the Act, the Government has the power to reserve for all time demarcated forests. Before any forest can be demarcated, the Governor must consent to the provisional demarcation. When it has been surveyed, due notice is given and anybody who has any objections can come forward and make them. If, after a certain lapse of time, no objection has been made, then it is declared by the Governor-in-Council a demarcated forest. At the present time there is provision under this Ordinance for the appointment of Forest Commissioners, three of whom shall be Government officials and two of whom shall not be Government officials. Once a forest has been declared as a demarcated forest then, save with the consent of the Forest Commissioners, it cannot be declared undemarcated.

One of our great difficulties is the variation of policy entailed by the appointment of new Governors at fixed periods. There is no provision under the Forestry Act for any policy at all.

The Forestry Act provides for the reservation of areas and for the reservation of trees on grass lands and reserves, but there is no provision made for any policy. If working plans were made there is no provision under the Act that they would be followed. Once working plans were made and approved by the proper

Authorities then it should be almost a penal offence for a Forest Officer not to follow those working plans.

A difficulty we have to contend with is that the Forest Officers are not sufficiently educated in forest exploitation. We set out to know all about the forests and we frequently come up against the settlers. We boast as authorities, naturally, and they frequently argue, "How can you be authorities when you cannot tell me how much money I get out of a certain forest?" We cannot tell them because we are not sufficiently educated on the commercial side of forestry. That is a point which requires very very careful inquiry. I can only speak for British East Africa, but I imagine that the difficulties which confront other Forestry Officers in other Colonies are almost identical with our own.

Colonel COURTHOPE : I thank you for giving me an opportunity as an Associate Delegate of saying a word or two. I broach the subject from, perhaps, rather a different point of view from those of most of you because I do not speak as a forester in any official capacity, although I am Chairman of the English Consultative Committee under the Forestry Act. That really, I consider, puts me in the position of a licenced critic.

It seems to me that the responsibility of the State for forest policy falls under three heads. First of all there is the matter of the State's activities within its own borders: secondly, there is the question of the State's attitude towards municipal and private enterprise within its own borders, and thirdly, there is the matter of co-operation with sister States throughout the Empire.

I think we should all be agreed that the State policy and the State activity within its own borders must provide, first of all, for continuity: the State must accept full responsibility for all matters of research and of matters of education and for the collection, collation and dissemination of information. On that I hope that the Forest Authorities in the different States will not think that they have done the whole of their duty in the matter of education, when they have entirely satisfied the scientific mind, because there is a very important duty on the part of the Forest Authority to disseminate the information in such a form that it will create general public interest through the populations within their borders. As to that I have been astonished during the last few weeks—I have had some responsibility in connection with the Empire Timber Exhibition—at the extent to which public interest in timber has been awakened, presumably owing to the difficulties which this country got into in the matter of timber during the war. There is a great awakening, and I think the Forest Authority here, and the Forest Authorities in other parts of the Empire, can and should take advantage of that awakened interest and keep it alive and expand it by the information and by the publicity which they employ.

Then again, I think the State must accept the responsibility for the link between commercial requirement and scientific production. I can quite conceive a State Authority making a brilliant commercial success of its own State forests and yet

failing miserably to fulfil its full function as a State Forest Authority, and I can conceive the other extreme, of everything being sacrificed to science and the commerce ignored. There is a happy mean which it is the responsibility of the State to search for and to find.

Again, the State has clearly the responsibility for setting a sound example in its own operations and that sound example must sometimes be of rather a self-denying kind. For instance, in this country the financial and fiscal position is such that it is very difficult to imagine a private owner planting extensive oak woods, but everyone will admit that the oak woods of England have got to be maintained. That is an instance of a responsibility of a self-denying kind that the State must carry on its own shoulders and not expect private enterprise to do for it.

I come to the question of private enterprise, which varies enormously in different parts of the Empire. I suppose the two extremes are India and the United Kingdom. Mr. Clutterbuck has told us that practically the whole of the forests in India are State property. In the United Kingdom, on the other hand, 97½ per cent. of the forest land is in private hands, and though we have the greatest possible confidence in the Forest Authority, there is no denying the risk that a State Forest Authority may become so absorbed in its own activities that it may tend to overlook and ignore private enterprise. The Forest Authority will, however, fail unless it succeeds in encouraging and assisting private enterprise to do on privately-owned lands what the State is doing on the State-owned lands.

For instance, you, Sir, and your colleagues will, I think, be judged in history, not by the success of your own plantations, but your success or failure in assisting in inducing the owners of the 3,000,000 acres of so-called woodlands in this country to replant them on sound forestry principles. What you can do on State-owned lands is a triviality in volume compared with what can be done and should be done by the tens of thousands of private and municipal owners of woodlands, a very small proportion of which are properly stocked at the present time.

My last point concerns the responsibility of the State for co-operation with sister States throughout the Empire. I very much hope that you will, during the proceedings of this Conference, be able to take the initial steps for the establishment of a Forestry Bureau throughout the Empire, which I know is one of your desires, and that you may be able to secure a permanence for this Conference which will ensure that not only is co-ordination of policy provided by correspondence, but there is actually oral interchange of views from time to time by the representatives of forestry throughout the Empire. This co-operation and co-ordination should be so developed that to some extent it organises output of forest produce in different parts of the Empire, because I am sure if that can be achieved on truly Imperial lines the greatest benefit will accrue to all the States concerned.

Mr. CUBITT (Malay States) : From what has been said, it is perfectly obvious that a forest policy is a good thing, but my point is that it is essential that a forest policy should be enunciated. In the Malay Peninsula the people are inarticulate ; there is no question of co-operation with the people ; the Government are responsible and solely responsible. There is no question of lack of money ; the amount of money which I can spend is limited, I might almost say, solely by the number of people who have to spend it. The Governments are perfectly prepared to provide (at a price) as many men as I want, but my experience of the last five years is that there is no sign of any declaration of policy. In fact in the last few months the new Governor has himself said, with reference to forestry, that a declaration of policy is rather likely to be a hindrance than a help.

In a country, such as the Malay Peninsula, there are three essential reasons why the policy of the Government should be enunciated. Firstly it is essential that the people should themselves know why there is a Forest Department and what its policy is, for unless they are told this very clearly they will resent the interference which naturally arises when land is reserved for forest purposes.

Secondly, the policy should be enunciated for the sake of the officers of the Government other than those who belong to the Forestry Department. There is no clear understanding, even amongst the Civil Service, why there is a Forest Department ; in fact the position is such that an officer who is in charge of very nearly the largest district in the Malay Peninsula, once enquired " What is the good of a forest reserve if you cut down the trees in it ? "

Thirdly, policy should be enunciated for the sake of the Forest Officers, and especially the Forest Officer who is responsible for the whole of the Department.

The Forest Officer should know to what end the policy tends, what is wanted, what the policy is. Without a policy he cannot know to what extent there should be rubber plantation or timber, and unless he knows that it is quite impossible for him to make proper provision, or even if forest reserves are made, to give reasons for reserving them.

The result of lack of policy is a casual parochialism ; each resident wishes to develop his own State on his own lines, and that generally means on lines which bring in the biggest revenue. There is also the feeling amongst the land officers of the Civil Service that the Forest Department are land grabbers, for without a policy it is very difficult for us to tell why we want forest reserves. Also, the want of a policy results in indiscretion, rubber land has been alienated all round tin mines, with the result that the timber, on which the tin mines depend, has been destroyed in order to form rubber plantations. These are reasons why forest policy should be enunciated, and I hope that one of the results of the Conference, if possible, will be a resolution stating that, in the opinion of this Conference, there should be a definite forest policy for every part of the British Empire.

Mr. ELLIS : I am a delegate from the Colonial Office, and what I am going to say you must take as rather my own view than as binding the Colonial Office.

The general principle of our relations to what are generally called the Crown Colonies and to the Protectorates at the Colonial Office is that we do not attempt to govern them from Downing Street ; the most we do is to try and control, to some extent, their Governments, and our general principle is to send out the best man we can find as Governor, and largely to trust him. But in the last 25 years there has been a great change all over the world in the functions of Government. Twenty-five years ago you sent out a sensible man, and he worked by rule of thumb, like our Governors in the days of Lord Palmerston, and fairly happily ; but various branches of science now have a great deal to say to Government, and you are confronted on all sides with experts in medicine, in agriculture, in forestry, and a number of other sciences. The Governor says : " Well, I will trust the expert " But then unfortunately he finds that the experts on different subjects do not agree. As Mr. Cubitt hinted just now, the Agricultural Officer says " This is splendid land for growing rubber," and the Forest Officer says " This must be preserved for high timber " ; then the Medical Department comes in and says " I cannot have this irrigation scheme because it is so unhealthy," and so on, so the Governor finds himself in danger of being torn into pieces by wild experts, and he sends an appeal to the Colonial Office, and then the Colonial Office has to scratch its head and think what is to be done.

The most formidable of all experts, not the most ferocious, but the most formidable, are the Doctors. We have set up machinery to deal with the medical problems in the Colonies which have worked on the whole well, and may perhaps be usefully imitated in dealing with forestry problems. We have a Committee consisting of about 6 or 7 eminent medical men, some with Colonial experience, some with Indian or Army experience, and one is an eminent Practising Physician which meets the heads of the departments concerned at the Colonial Office in Committee, and there they consider the reports of the Medical Department of each Colony and also any particular medical question that the Secretary of State may refer to them, and then they furnish the Secretary of State with their opinion. I think, on the whole, something of that kind could be applied usefully to forestry.

Of course, the most important thing in forestry that I hope such a Committee would help us towards, is to get continuity, not to make forestry depend upon the idiosyncrasies of a particular Governor. The experts on this Committee would see the report of the Forestry Officer of the Colony, or they would see him personally when he came on leave, a very valuable thing I have found in connection with the Doctors, but then they would sometimes be able to say, that a certain matter had been decided as a part of State policy and that they must have the policy restored and carried out.

SIR HUGH SHAW STEWART : As Chairman of the Consultative Committee for Scotland, my sympathy extended to the Forestry Commissioners when Colonel Courthope said that their work as producers of new forests is as nothing compared to the duty that lies before them in instigating private owners to replant their areas. I quite agree that is a very splendid aim, but it is a very difficult one, for the Forestry Commission will have to be faced with persuading the Government to make some changes in taxes and in rating. They will have to persuade the railways to make some differentiation between carrying home timber a short distance and a long distance, and they will have to educate a large number of private owners who are, I am sorry to say, very much in want of forestry education.

I fully agree with him that the public interest is greatly aroused in forestry questions, and I would support very strongly Colonel Courthope's suggestion as to the dissemination by the Forest Authority of useful information. I know that the Forest Authority has not been long established and I know that they are very active, but when they are once thoroughly established I hope they will issue a bulletin from time to time and send it to all and sundry who are likely to have anything to do with planting or replanting.

Speaking as an owner of woodlands, there are two subjects of special interest at the next planting season. One is to ascertain exactly the best distances to plant quicker growing conifers and slower growing conifers. It seems to me the proper close distance for, I will say, ordinary conifers might be disastrously close for the quicker growing conifers such as Douglas and Japanese Larch, and to some extent Sitka Spruce.

The second point concerns the seasoning of timber and putting it on the market for all kinds of use. I feel sure that the Forest Authority will welcome the suggestion of disseminating useful information.

Mr. C. E. LANE POOLE : First of all I wish to congratulate Mr. Clutterbuck on his very able paper. May I also offer to Sir William Schlich what I am sure every Forester of the Empire feels, namely, a deep appreciation of the great work to which he has devoted his life, the Master of British Forestry.

The reason for the apathy as to forestry throughout the British-speaking world is that we have no forestry in England, and when the young men went forth to colonise they took with them no tradition of forestry; they knew nothing of it, and when they found trees they generally cut them down to make farms or for other purposes, and they made no attempt to establish forestry in the countries to which they went.

There really can be no difference of opinion on the question that the State and the State alone is responsible for the timber requirements of the country. It is only the State that can obtain money at a sufficiently low rate of interest to finance forestry operations over 100 or 150 years. The State alone can, I do not say it always does, establish a continuity of policy over the same period. Private enterprise can, no doubt, plant, and I hope that

private owners will continue to plant much more than they have in the past, but private enterprise cannot grow big timber, the timber that the State wants for its use, for its big industrial concerns; it can grow small timber on fairly short rotation, but when it comes to growing large timber on 100 or 150 years' rotation, the State alone can do it. Therefore it is a responsibility for the State to adopt a forestry policy.

The objections to the State adopting a forestry policy are generally based on quite erroneous premises. One is the enormous advance of timber substitutes. On looking into that question, we find that the country which invented these timber substitutes, America particularly, is really using *per capita* more timber to-day than before the timber substitutes were invented. The same thing applies to England. We are using 300 per cent. more timber *per capita* than we were 60 years ago. These objections are not sound. From the cradle to the grave, as an American has put it, we use wood. We must always use it and the State must supply the wood.

In the self-governing Dominions, speaking particularly for Australia, the greatest difficulty we have to face is the feud between grazing and forestry. The young men came out with no traditions of forestry and the only way by which they could make a living was to farm, and so they cut down the timber in large quantities in order to make farming land, and in many cases land which was not farming land was converted into waste land. Thousands of acres in Australia have been converted from good forest to bad grazing. There is plenty of grazing which will only carry one beast to 100 acres, and that is what must be prevented at all costs. And yet it is very hard to prevent it. One is continually met with arguments such as: "What has posterity done for us; why should we worry about the future? We want men, not trees." And you have Ministers and Government setting out so-called land settlement policies, which in many cases have only the object of making one blade of grass grow where two trees grew before.

The great difficulty that foresters are faced with is how to induce the Governments of the various States to constitute a Forest Authority. A great deal of propaganda work is necessary and specially we should get the whole of the public life directed to the forest situation, otherwise the Government is apt to sink back into apathy at very short notice. I will give one instance. In Western Australia, 23 years ago, a Forestry Department was appointed and a Forestry Bill was actually framed, and there was a great feeling that forestry should be established. Unfortunately, the forester died, the Bill was scrapped, and the Government sank back into apathy which has lasted 23 years.

In regard to what Mr. Ellis said in connection with the establishment of a Committee in London—whether it should be done by a Committee or by the appointment of one man as Inspector-General, to look after the whole of these interests, is a matter of opinion. But the question of the responsibility of the State for forestry is so important that I think, if the work of this Conference results in the Governments of the self-governing

Dominions and of the Administrations in the Crown Colonies and other Dependencies adopting this principle, then this Conference will have gone far to achieve a decided step in advance.

Mr. C. E. LEGAT : In South Africa the Government of the Union has already assumed responsibility for a forest policy. The work that lies before the Government is the conservation of existing forests and the expansion of afforestation. As far as the conservation of the existing forests is concerned, the Government has demarcated and set aside permanently, much on the lines of the Indian Government, the best of the indigenous forests, and as far as afforestation is concerned it realises that this work can be more suitably dealt with by the Government than by leaving it to the haphazard efforts of private individuals. At the same time the Government is very anxious to enlist the sympathy of private people and it does everything that it can to get them to look after their own forests, and also to plant trees on as extensive a scale as possible. Facilities are placed in the way of private owners to get trees easily and at reasonable rates, and the Government sends its officers to private properties to advise the owners as to the best trees to plant and the best methods of planting them.

A great deal has, I may say, been done by private enterprise in the shape of the planting of wattle plantations. This is a plant that takes a very short time to come to maturity, some 8 to 12 years, and the Government realises that this is a form of afforestation which is best left to private enterprise, but the results have been extraordinarily successful and by private enterprise alone some 300,000 acres of land, mostly in Natal, have been afforested and it has resulted in producing a return to the country of some £600,00 a year.

The lines the Government propose to go on are to extend as rapidly as possible with afforestation and to look after and care for and improve the forests they already possess.

Mr. C. LEAVITT : We have in Canada a very large percentage of non-agricultural land, which must remain forest if it is to be of any material value to the country as a whole. Also a very high percentage of forest area still remains Crown timber land, and therefore is subject to any regulation that the respective Governments may see fit to impose. Therefore, we think we are in a very fortunate position with regard to the future handling of the forestry situation regardless of what the present situation may be.

The Province of Nova Scotia is the only one of the Provinces which has parted with the ownership and control of a very high percentage of its forest lands. New Brunswick also has about one-third of its forest area in private ownership. In most of the other provinces, a very high percentage of their forest lands are still in the hands of the Crown.

Mr. Wilson has already emphasized the extreme desirability of an education of the public in order to carry through a programme of forestry. That certainly has been found to be true in Canada. It is necessary, not only for the reasons which Mr. Wilson has set forth, but also in order to enable the Governmental Authorities themselves to make progress with their forestry policies. In a

democratic country you cannot have your legislation, or particularly the enforcement of it, too far in advance of public sentiment, and you have to develop your public sentiment to keep pace with the progress you want to make. Legislators, of course, are responsive to public sentiment, and if they believe that public sentiment will not support a given project, or suggested line of legislation, you are sure to have a great deal of difficulty in having it put through, or in getting it enforced, in case it is put through. The question of appropriations comes in there also. You have a great deal of difficulty in getting appropriations through if you have not a good real educated public sentiment behind your programme.

We have in Canada also the private lands, which are going to be a problem of the future. Thus far not very much attention has been paid to forestry on private lands, although considerable progress has been made in the direction of fire protection. Generally speaking, the efforts of the Government Departments are directed mostly towards the protection and administration of the Crown timber areas. But they are coming in the United States to a point where they have to consider very seriously what shall be done in the way of restrictions on the handling of private timber lands, and the suggestion there is that it is the duty of the State to see that the process of denudation does not go so far as to endanger the interests of the people as a whole. Particularly it is necessary to take up the question of forest protection on these privately owned lands. Some timber owners are very progressive, and many of them go ahead and look out for this matter of their own motion. Others will not do so, and it seems very important that the State should take some action to see that these non-agricultural forest lands are protected from fire as a first step, and other steps, of course, can follow later as the occasion develops.

One of the first essentials is the segregation of the agricultural from the non-agricultural land. We have had a great deal of trouble in Canada with the settlers going in on the non-agricultural forest lands, cutting the timber and following this in very many cases by abandoning the land, and, of course, that constitutes a very serious fire hazard, and is contrary to the public interest.

The development of a forest policy is a matter of evolution. You have to make your progress by degrees, beginning with fundamentals. Again forestry is a matter of economics rather than of sentiment. We have had in both Canada and the United States in times past appeals from the sentimental aspect, and our experience is that comparatively little progress along practical lines is made in that way. You have to base your arguments on grounds of economics and to show that it is a good business from the Government point of view before you can expect results. That is especially true with regard to private forestry. You cannot expect a private owner to make a sacrifice of his private interest to grow timber for the benefit of the public.

Our great problem in Canada, is the handling of our natural forests. We have hundreds of millions of acres on which only the most primitive methods of forestry practice can be carried

out, owing to the great distance from transportation, and there you can only impose your requirements as it can be shown that these requirements can be carried out and still leave a reasonable margin of profit for the timber. There are many things that ought to be done that cannot be done because it would render the operation unprofitable.

Of course, with the rapidly increasing prices of timber, we can now hope to go ahead faster than we have ever been able to do before. A main problem is to impose regulations so as to ensure a reasonable amount of natural regeneration of the more valuable species. We have, for example, very large areas of mixed hardwoods and conifers, and many of these areas are remote from any other means of transportation and are dependent upon steam driving. The hardwoods do not drive readily for any great distance, and therefore over very large areas we have had consistent cutting of the conifers, leaving the much less valuable hardwoods standing, with the result of turning the forest into a predominantly hardwood forest. Until we can do something with our hardwoods in these areas we shall not get very far in technical forestry practice. Large areas are held by the pulp and paper companies, and it seems that these pulp and paper companies, must depart from their previous policy of using for the most part only the conifers and find some outlet for the hardwoods either in the pulp and paper industry or through the development of subsidiary industries which will take those hardwoods and enable the conifers to have a fair chance.

One other point: The Forest Authority should have control of all the lines of forestry activity within a single organisation. In Canada, for example, in the Dominion Government organisation, and also in Ontario, we have forestry branches, but in neither of these two particular cases does the forestry branch have the timber administration on the licensed timber lands, which, of course, comprise the bulk of the timber on the Dominion Crown lands. The Forestry Branch handles fire protection on all of the Dominion Crown lands, and handles timber business on the unlicensed Crown lands, but there is another branch which handles the timber administration on the licensed Crown lands, and in that Organisation there is not one single technically trained forester, and therefore we have a very anomalous situation.

In Ontario we have a Forestry Branch which is charged only with fire protection and nursery, and, to a very small extent, planting work. There is another branch for the Provincial service which has the administration of the timber business and in that organisation there is not one single technically trained forester. Nor do they make any pretence of carrying out forestry practice in these lands; it is a question of administration for revenue only, and, until we get something done along these lines, we cannot hope for any roseate prognostications for the future along forestry lines.

There is, however, a judicial investigation under way at the present time in the province of Ontario, and there seems to be

some reason to expect that the outcome will be a transfer of the timber administration to some technical forestry authority.

In Nova Scotia we do not have any technical forestry organisation at all, but the matter is under consideration by the provincial Government, and while it has been hanging fire for years, we are still in hopes that they will get round to the appointment of a provincial forester in time.

Sir CLAUDE HILL : There is hardly a word that has been said throughout the discussion this morning to which we, the Delegates from India, could not whole-heartedly subscribe, and therefore, I will only endeavour to co-ordinate the description from India given to you by Mr. Clutterbuck, with the views which have been expressed by some of the Delegates here to-day.

For example, Mr. Clutterbuck quite correctly points out and emphasizes the favourable position in India of the State in relation to the acquisition and the control of forest lands, on which Mr. Wilson has very aptly commented that the preferable position really is one in which the whole community understand the objects of forestry, the Forestry Department operating on behalf of the whole community, and not on behalf of a bureaucratic Government from above. And I can illustrate the great advantages of such a situation, over that which we occupy in India, by a reference to our past history in forestry. The Forestry Department in India was conceived upon a continuing basis, as you have been told, about the year 1855, and from then for a considerable number of years onwards the tendency naturally was one of over-zeal on the part of a new Department in seizing as much as it could. Zeal outstripped discretion and I myself, as a Revenue Officer, have been up against the various officers in the past in endeavouring to reduce somewhat the zeal with which they were grasping every conceivable kind of land on which trees could be grown. The feud between agriculture and forestry at one time was rather a bitter one, certainly in my own Presidency. However, that is ancient history now; and during the past 25 years certainly the Revenue and the Forest Authorities have acted hand in hand together, and I do not think that there will be any reason for public opinion hereafter finding that the Forest Department has exceeded its legitimate functions.

At the same time, with reference to what Sir William Schlich has said with regard to forestry in India, it is apt perhaps at the present moment to explain that India hopes to approximate to the conditions obtaining in the self-governing Dominions, and that with the political changes at present in progress there will be a gradual transfer of the control of forestry to what we hope will be a representative form of government in due course.

That makes it all the more emphatically necessary for us from India to enforce the claim which Mr. Wilson and others have made in the case of self-governing Dominions, for great effort, not only in the education of forest officers as such for the technicalities of their work, but for the education of the owners of forest property and, finally, for the co-ordination of instruction in

that popular form which will educate the public. In the last resort in India in the future, as in the Dominions to-day, the appropriation of funds depends and will depend more and more on the votes on each Annual Budget, and if we cannot advertise our goods satisfactorily in such a way as to convince the representatives that it is necessary in the interests of the State to conserve their forests and to exploit them economically, then we shall not get the appropriations which are necessary.

That being so, I endorse most cordially all that fell from Mr. Wilson on the subject of the need for instruction and education. And in particular we in India are notoriously bad advertisers; we shall have to amend that. Mr. Perree has recently been setting his mind to work to bring about an improvement in our publication system, and I feel certain if and when we have an Imperial Clearing House of forestry opinion our publication work will be largely encouraged to the very great advantage of the Empire at large.

Mr. ROGERS : In West Indies, we are in an early stage of development and two of the largest Colonies that contain the largest areas of forest are at present without any Forest Department or any trained staff. It seems strange to have to represent a very small Colony which has really begun work and got to some stage of advancement, when, in the same neighbourhood there are two Colonies with very much larger areas of forests that have not taken any steps at present to set aside forest reserves for the supply of timber for local needs, for export, and also for the protection of water supply. That ought to have been done years ago. I hope that the result of this Conference will be to draw attention to the necessities of those two Colonies—British Guiana and British Honduras.

We are sometimes faced with the difficulty that a Governor who is only in the Colony for a few years may want, for some reason, to give up a part of the forest reserve contrary to the advice of the Technical Adviser. That makes it very difficult for the Technical Adviser in a small place; he does not hold a large position; he is not, for instance, a member of the Council, and I think it is of great importance that something should be done which should prevent the destruction of our forest reserves, just owing to some temporary occasion which might, however, form a principle, and so destroy all the other forest reserves to the great detriment of the country where it has been made.

Mr. THOMPSON : The land in West Africa belongs to the Native Communities, and the paramount Government does not own them, so forestry in those possessions has to deal with private property, and that is an exceedingly difficult proposition. Hitherto, by tact and the goodwill of the Political Officers and the Administration generally, it has been possible for the Government to get partial control over some of the best Provinces, but that is a thing that depends entirely on goodwill. There is no certainty whatever of our being able to get hold of the correct proportion of forest within a reasonable time, because the general system of cultivation is the shifting method employed in Burma.

Every year hundreds of square miles of forests are cut down, the wood is burned and the area farmed over for three or four years. Then it lapses into bush. When it is anything from 10 to 15 years old, they come back to it and cut it down again. Without an adequate staff, both a forestry staff and a surveying establishment, it is exceedingly difficult to keep pace with the rate at which destruction is going on. Whilst we are thinking of legislation and propaganda and all that, the substance is disappearing. Since I have been in Nigeria, a matter of 17 years, something like 40,000 square miles of good forest have been cut down for farming, and as the population increases and peace is established amongst these different tribes, the situation will get worse. Propaganda is a thing that takes a long time to establish. Meanwhile, the forest goes. Therefore, I think, in places like that where the people are not really civilised enough to understand the situation, the Government should take it under their control more than they do at present.

Mr. GRAINGER : Nobody has yet spoken from the point of view of the operator, the man who takes the timber out. The thought in my mind is this, that in any consideration of forest policy, there should be more consideration of the industries which depend upon it. I do not want to put this in any hostile sense, but I have noted sometimes among foresters a lack of sympathy with the operating end, and, I might almost say, a latent hostility to it.

The CHAIRMAN : I will just try and bring out one or two points upon which we seem to have reached agreement this morning. There is no doubt that we are, as a whole, dissatisfied with the position of the State as regards forestry at the present time. We have had clearly brought out to-day lack of policy and changes of policy in many different parts of the Empire. These have been spoken of at first hand with a candidness which we must admire and which we must have listened to with great attention.

A second point which has been brought out very clearly is the necessity of education in order that the Empire may realise the position of forestry in the Empire to-day. We must know what the resources of the Empire are, so that we may see what are our wants and may have these wants met not only to-day, but in the future. The establishment and the careful maturing of a timber crop takes, as a rule, at least a century, and we require, therefore, to know our position as much in 100 years' time as we do at the present time, because the policy which is going to give the results in 100 years has got to be settled here and now.

Several statements have been made of the importance of an Imperial Bureau with the view, in the first place, of ascertaining facts and disseminating information as regards resources, and also the use of such a Clearing House on the question of publicity. An Imperial Bureau would help all these matters towards realisation. Sir William Schlich has defined very closely the importance of a State Forestry Policy and State Foresters in giving a sustained yield from the forest. It is from State forests only that we can hope to get a sustained yield over a definite period, and

it is important, therefore, that we should have our forest reserves, and also, in the case where no forest reserves exist, that we should settle our policy as soon as possible as to what area we intend to be forest and which we intend to prevent from denudation.

The question also has been raised of the relation of forestry and foresters to the commercial side. That, obviously, is a matter in which an Imperial Bureau can be very helpful in providing statistics of present and future yield.

One further point: the question of the position of the Forest Authority in this country to the private owner. As Forestry Commissioners we regard our duty towards the encouragement of private forestry as one of our most important duties. We are fully aware of the fact that over 3,000,000 acres of forest in this country (that is to say, something like $97\frac{1}{2}$ per cent. of the forest land) are in private hands and until the time, which may be 40, 60 or 80 years, in which 1,750,000 acres of State forest are established, it is very obvious that our safety in time of danger lies with the private forests. I agree that there is always a danger of the Forest Authority concentrating over much on its State forests, and that is a matter that we foresters, throughout the Empire, certainly ought to watch and to look to. The mere interest of private individuals in forestry is likely to have a helpful effect in getting our rulers to look with beneficent eyes on forestry, and as has been so clearly brought out from Australia, Canada, Africa and the Crown Colonies, the necessity of getting together an educated public opinion so that a forestry policy may be decided on, and decided on quickly, is one of the chief reasons and the chief objects which we may hope to accomplish by this Conference.

(After an adjournment.)

THE FOREST AUTHORITY.

Mr. ACLAND, M.P.: I regret that my paper, such as it is, cannot be in your hands. I began it yesterday morning and I finished it at a quarter-past three this morning, and I have not been able to get it into type since then.

In framing these notes, I have kept in view the desirability of finding a common policy which should express the general aim and inspiration of the Forest Services throughout the Empire as to their own constitution and status. There was no such common policy to be found on the surface—either in the reports presented or from conversation with delegates. Both as regards the status of the Forest Authority and as regards the direction in which advance was most required, there seemed as many varied sets of conditions as there were authorities. For instance, it appeared that in South Africa the Government and the people were in favour of a forward forest policy, but the difficulty lay in obtaining a continuous supply of the necessary funds with which to carry it out. On the other hand, however, across

the Indian Ocean, in the Federated Malay States, there was no difficulty about money, the want was a definite land policy. Going back again to Africa, in an East African Crown Colony there was a beautiful forest policy laid down in the preamble of the Forestry Ordinance, but towards the putting into force of this policy the Government are apathetic, the people antagonistic, and the lumbering industries positively hostile. Going diametrically through the world to British Columbia, we find things better in this respect. The Government and the private timber trades are financially interested in taking a longer view of the importance of timber conservation and development. What is wanted is a Forest Service consisting of men who have the prestige which attaches to officers who at the same time have the highest training in forestry and a personal experience of the technical and business side of forest utilisation. Given a service with this prestige, their methods of propaganda and publicity would quickly direct the favourable public opinion towards correct methods of production, conservation and utilisation.

In the older communities in the East of Canada the present position is the result of the historical development of the past. The private individuals wishing to use or to exploit the forests were gradually brought under the regulation of a department for revenue purposes, staffs of clerks being appointed to see that the Government got its fair share of the proceeds of lumbering. Then the Government realised the necessity of fire protection and separate departments were established for this purpose. Thirdly, and later on, the importance of regenerating the woods was realised and forestry departments were started. The result is that one finds timber business and fire control divorced from forestry—an obvious defect of system shared with Rhodesia, which is said also to have the commercial department separated from the producing department.

The Canadian provinces should have the less hesitation in seeing to it that all their lumber activities are under the guidance of a correct forest policy if they will study their finances. Thus Quebec gains \$3,000,000 revenue from timber a year, but puts back into forestry only \$200,000—which means that the province is to an unjustifiable extent using its capital to pay its current expenses.

Newfoundland, which has nearly completed three centuries under the British Crown, has not advanced as far as its younger and larger neighbour, as its forestry activities are confined to the spending of an inadequate \$5,000 a year upon a fire patrol system.

The difficulty before the Australian States is to bring the standard and practice of all up to that of the best. They awoke about 15 years ago to the danger of unrestricted alienation. They passed protective laws establishing forest reserves, but only two of the eastern States went to the logical conclusion of accurate demarcation and permanent dedication of forest land. The war caused the public to realise the necessity of closer attention to administration and management, so that now several States such as Victoria and New South Wales have an independent Forestry

Commission, and Western Australia, though it has not a Commission but a Conservator, has seen the wisdom of giving him adequate powers. What seems to be needed in all the States is steady and systematic progress with surveys, followed by regulation of felling and provision for regeneration; while Queensland needs to prevent all their forests remaining under the tender mercies of private exploitation, and Tasmania not only has as yet no provision against alienation of forest land, but no Forestry Act.

Three of the states have an excellent provision whereby a certain proportion of the revenue from timber is set aside as a fund which can be used only for forestry. And it may be that the agreement recently come to to establish for the Commonwealth a school for the training of Forest Officers may contain in it the germ of a service of inspection and advice upon forest policy which shall be applied to the whole of the Commonwealth. Such a system exists in India, and will continue under the new Act. The Act will indeed apparently make little change, for the local governments have long been responsible for their own forest policy which will continue to be administered as a reserved service under the provincial Governor and his Executive Officers. The forest service will continue to be uniform for the whole of British India, and it is much to be hoped that it has struck its roots so deep by its high traditions and great usefulness to the people of India that the political changes which the future may have in store will leave it secure.

I come lastly to the United Kingdom which seems to have almost everything that the heart of the Forester can desire in the constitution of a Forest Authority. It will be the fault of the Forestry Commission if they do not make full use of it. To them I can only suggest a motto *ligna non verba* which being interpreted means "stop the talk and get to the timber." I feel sure that my colleagues will see that it is put up prominently over my desk in the office.

This hasty sketch of our varying conditions is all that my limited time has allowed of, and I shall be glad of criticism which will enable me to bring the light and shades into clearer relief. Let me now try to extract the principles which should govern the status and constitution of a Forest Authority.

It is tempting to explore, as a preliminary, the question of how a forest service should be established, but on the whole this profits as little as the speculation as to the priority of the hen or the egg—a speculation which has always seemed to me curious as omitting consideration of the cock, who presumably had some hand in the matter. Some countries have evolved the correct principles for a forestry service complete and beautiful as Minerva from the head of Jupiter, but only under the influence of strong emotion. In the case of India and Great Britain, the two cases in point, the emotion was funk. But in general it seems true that Governments seldom evolve anything beautiful and complete, least of all a forestry policy which requires the union in one document of practical good sense and imagination, both in the highest form. Statesmen seldom have either, and very seldom

both. Let me quote a delegate : “ We must take it as an axiom that Governments have no ghost of a suspicion of an inkling of an idea of forest policy.” If this is so we shall not be surprised to find that many admirable forest services can only give Topsy’s account of themselves—“ Guess I grewed.”

However it may be constituted, there seems to be one central principle the observance of which is essential for the healthy development of a Forest Authority, namely, continuity of policy and freedom from interferences caused by the changes and chances which overcome Governments and their policies. May I be allowed to quote, even though I believe I wrote it, a paragraph from the Report of the Reconstruction Committee on Forestry, pages 62 and 63 :—

“ A considerable element of independence is almost as important in the Forest Authority as unity of direction and control. Though the afforestation of many districts must proceed hand-in-hand with their development for agriculture, afforestation cannot wait upon agricultural development. Agricultural policy and practice may vary, if not from year to year, yet from decade to decade, to the benefit of the industry; afforestation policy must be uniform for generations. Nor can the progress of afforestation be made, as has been assumed in some quarters, to depend upon the state of employment, except for a limited period of time. We have shown in another part of our Report the extent to which it is legitimate to depart from the system of equal annual plantings spread over the whole area of each working section. To this very moderate extent, and in the construction of forest roads, afforestation may help in providing employment in periods of depression, but a general system which made progress in afforestation dependent upon the general condition of the nation with regard to employment would be fatal to a proper afforestation policy. Further, the afforestation policy of the State, once embarked upon, should be as little as possible liable to be disturbed by political changes or moulded by political pressure. We cannot, and do not, claim that it should be independent of Parliamentary control, but when Parliament has once adopted a policy of afforestation the decisions that have to be taken as that policy develops should not be taken by politicians, and if grievances and difficulties arise they should be adjusted in an atmosphere in which forest policy and not political expediency is the deciding factor. The last respect in which independence is important is with regard to funds. An element of control is, of course, essential, and it may well be strictly enforced. Parliament must be informed of the cost and result of each year’s work. The public, in fact, will want to know and will have a right to know, that they are likely to get value for their money. This, however, ought not to be incompatible with an arrangement under which the Authority will have, during its early years, at any rate, a greater degree of certainty as

“ to the funds which it will administer than is generally
 “ produced under the system of submitting annual votes to
 “ Parliament. If there were a power to pull up the
 “ Authority by the roots to see how it was getting on, the
 “ results might be almost as serious as if a similar process
 “ were performed upon the trees that it had planted. The
 “ Authority, like the trees, must have a chance of striking
 “ deep root, and must therefore be able to plan its work
 “ for some years ahead with the certainty that it will have
 “ funds to carry it out.”

It will be seen that this desire for independence is in no sense that which the public is apt to ascribe to public officials as a class, which may be expressed by the phrase “ When I am appointed give me a good salary and let me alone until I desire to retire on a good pension.” It arises from the essential conditions of the industry. Foresters are the only class of the lay community who on week-days as well as Sundays are concerned not with the here but with the hereafter. They sow that others may reap. They must think not only in terms of time but almost in terms of eternity. But he is a long-sighted politician who thinks beyond the next General Election. The moral is surely obvious.

But we must always lay stress on this: just because the forester's work can make no immediate appeal must he be the more constantly and closely in touch with public opinion. The man who grows onions does not need to explain what he is doing and why he is doing it—the public judges by the onions. But an authority which asks the taxpayers to devote funds to a service from which none of the present generation may see the full return, must be constantly explaining and popularising its work, and showing the public why they should undertake a present burden in the interest of their future prosperity. Besides, even had not forestry a special responsibility to the future, it is surely an old-fashioned and now untenable point of view that the Government or any Department of Government is one and the people another, that the Government is set over against the people to rule them, independent of their conscious volition. As one of our Delegates expressed it, “ the policy of the Forest Authority should always be the policy of the Government—which should always be the policy of the people—and it is the duty of the Forest Authority to make it so.” No organic forestry laws, no dedication of forest reserves, no inalienable forestry funds will save a Forest Service in a time of trial if it has not got public opinion behind it through sound methods of education and publicity.

In particular, it would seem that a Forest Service must be careful to avoid the error, which, perhaps, a British training is apt to produce—of regarding the growing of trees as an end complete in itself. A tree is a vegetable which is grown to be used in exactly the same way as is mustard and cress, and the tree is ruined just as is the mustard and cress if it is not cut in the proper manner when it is ripe for cutting. The forester

though he may impose conditions upon the timberman, and do so in the timberman's own interest, is really his servant. He must constantly be thinking with regard to the timberman, "Am I growing what he wants, how he wants it, where he wants it and when he wants it?" All forestry science and practice must be tried by these questions, and by the answers they will stand or fall. In other words, we must avoid the feeling, again suggested to me by a delegate, that the forester alone is the true artist in growing nice trees in nice rows, who, when his work is done, graciously allows the lumberman like the dustman, to call at the back door to remove the garbage.

Perhaps these are truisms, but I hope that they are none the less worth bringing forward in these early days of our first Conference.

I proceed from the status of the Authority—its relations to what is external—to its constitution—that which is internal—and consider very briefly Forestry Laws, Forestry Finance and the Forestry Service.

It appears desirable to have carefully framed Forestry Laws or Ordinances, so that the aims of the community shall be placed on permanent record, and thus be the less likely to be departed from. In the case of a Crown Colony, one Governor may have ideas which are not those of his predecessor. Even in India, it may be the same with the Members of Council in charge of the Land Revenue Department, and however broad based upon the people's will may be the policy of the Forest Department, it is well to be able to appeal from the fads of a temporary phantom to the wisdom of the ancients enshrined in sacred writings. More particularly should there be permanent forest reservations, which can only be alienated, if at all, after mature consideration and on the grounds of the broadest policy. The best is, however, often the enemy of the good, and it should be borne in mind that if the Forest Service tries to tie its land up too strictly so as to prevent any form of alienation, it may fail to obtain the reservation which it requires. But we may wisely attempt to secure that the setting aside of land for forestry shall be by a process of formal dedication, and that means shall be taken to show the people that they are doing something, with regard to which the presumption is that they ought not to do it, if they determine to alienate forest land to other purposes. This may be done in various ways. Alienation may require the assent of both Chambers of Parliament. That assent may have to be conveyed in more than one Session. A higher authority than the local authority immediately concerned may be required to give sanction to proposals for alienation and they may be required to call for a report before taking their decision—from an Inspector-General or other Officer who will, presumably, be superior to temporary circumstances or variation of policy. Just by the way I may say that it is a curious commentary upon the care we take before doing anything which will be of permanent value

for all time, and our recklessness in doing permanent harm, that in India, where a forest gives security to the livelihood of the local population, all sorts of enquiries and reports and notices and procedures have to be gone through before a forest can be formed, but land can in some cases be alienated—which may mean the permanent destruction of the livelihood of thousands—without any formal enquiries and procedures at all.

As to finance, it may be said in general that it should be easy to obtain money to finance a Forest Service, for, if a State has no forests, money is clearly required to establish them; if it has forests it can spare some of the money it makes out of them for their development and regeneration. If we were satisfied that the Forest Services of the Empire were giving the full value of which they are capable to the communities which they serve, the problem would be to have the funds devoted to forestry put upon a permanent basis, so as to avoid the chance of their being raided in Annual Parliamentary Estimates in the interests of more immediate objects.

But most of our Services are still in the period of growth, some in a period of very early growth, and they must necessarily take every chance they can of steadily increasing the sum devoted to forestry from year to year, and this entails an annually renewed appeal to the Legislature. On the whole, it seems that the system adopted in the United Kingdom may be a useful model. A certain sum is granted to the Forestry Commission to serve for ten years—estimates of the amount to be drawn against this sum are annually presented and approved by Parliament, and the Commission realise that, only if at the end of the period they can give a good account of what they have done, will they be able to obtain a further grant.

As to the Forestry Service itself, the members of it should expect to have the same security as is given to public servants in general—no less and no more. Like other public servants, they should look forward to adequate pensions—if only because it is so much easier when pensions are adequate to relieve the service of an officer who has ceased to pull full weight in the boat. Service in the higher ranks must depend upon the attainment of the highest standards of training and the most careful selection—not only because nothing less will ensure the application of right principles to what is extremely technical and scientific work—but in order to secure that there shall be no sort of suspicion that appointments are made for personal reasons. Forestry work—one who is not a forester may be allowed to say it—is extremely hard and exacting, and in self defence foresters have a right to claim that only those persons shall be made their colleagues who have the technical equipment necessary for the work.

Finally, as to salaries, I feel certain that it must be extremely bad economy for any Forest Service to pay badly. If a forester is to make himself trusted alike by loggers, timbermen, graziers and stockmen, sportsmen and prospectors, he must have time to become established. He must, however great his ability and

ambition, desire nothing better than to grow grey in the Service. He must, therefore, be placed beyond the temptation of taking while still a young man a higher salary, say from a timber firm. If salaries are kept low, a Government will never obtain for its Forestry Service that prestige and respect which is more than half the battle in the successful conservation of their timber wealth. In other words, though they pay little, they will get bad value for their money.

Another point is perhaps worth making—we should never allow the apparent attractiveness and freedom of a forester's life to be used as a justification for low pay.

I consider, lastly, whether there should be any special provision as to the constitution and position of the body or individual who is at the head of the Service. The plan of having a Forestry Commission, the members of which will not change all at once, but will be not likely to be re-appointed after their terms of office when they have ceased to be useful, seems to be worth attention. It combines the element of change with the element of permanence, and guards against violent fluctuations of policy. This plan seems to have been adopted in Australia as well as in the United Kingdom, and it would be interesting to hear of its working from those who are more accustomed to it than we are yet in this country.

I must conclude by an apology. This paper has been in part cast in a positive and didactic mould. There is, I know full well, much more to be said upon some of the subjects touched upon than I have attempted to say. But I intended to provoke discussion, and I do not think I shall have failed. Other defects of my paper can, I think, reasonably be set down to the extreme pressure under which it has been prepared.

Mr. MACKAY: In Australia 90 to 95 per cent. of forest is the property of the State. Therefore, I think it may be accepted that the State is and must remain the main Forest Authority. The areas dedicated as forests up to the present are, in round numbers, as follows :—

Queensland, 2,000,000 acres.
 New South Wales, 5,000,000 acres.
 Victoria, 4,000,000 acres.
 South Australia, 160,000 acres.
 Western Australia, 2,500,000 acres.
 Tasmania, 600,000 acres.

As regards the Forest Authority in Australia, for a long period it was under the direct control of Ministers holding office with their party. Australia was practically without forest legislation up to about the year 1900. Shortly after that year, the Australian States began to frame new legislation. Under the old system it was mainly a question of providing temporarily supplies of timber for the goldfields and for the various industries then being established in the country.

Victoria was the first to bring in a reasonably framed Act, which to a limited extent was on the lines of the Indian code. It did not provide, however, for independent policy but left the forests to a large extent under the control of a Minister, and a Conservator, who in dealing with policy and to some extent management was

distinctly subject to control by the former. New South Wales attempted various forest legislation virtually on the same lines. Up to a recent period, these two remained the sole examples of forest legislation properly so called, but some two years ago Western Australia also introduced an Act which took advantage of the older legislation of the sister States and also of their experience, but it left the forests, however, under the control of one official, the Conservator. The main principles of this legislation were the demarcation and dedication as permanent reserves of the larger and more valuable areas of forest. As regards timber reserves which bear inferior timber and which may under certain conditions, if there is a demand for land settlement or for other cogent reasons, be abolished and thrown open to settlement, this class still remains in the forest legislation of several States, including Western Australia, but in practice the method of adopting two classes, a superior or permanent class and an inferior class, has worked badly, and I think the trend of future legislation will be to abolish the term "timber reserve" and to class all as permanent reserves.

Where the reserves are permanent, no Government holding office can without the formal consent of Parliament alienate any area, but, since the war, in two of the States special provision has been made by an Amending Act to free certain land which may be required for the settlement of soldiers. This is merely a temporary measure, and in the case of my own State, Victoria, it will disappear from the statute book at the end of the present year.

As regards the method of classification and demarcation, I think we may regard it as essential that forest areas should be thoroughly examined before they are permanently dedicated or set aside as forest. In a self-governing community, with Parliament in session every year, it surely shows a lack of caution and foresight for any forest body to seek to set aside large areas which have not been thoroughly examined.

Looking at the whole question broadly, I should say that, in Australia, no forest authority will oppose the throwing open of areas of inferior forest bearing good soil if it can be reasonably used and well applied for the purpose of grazing and mixed farming, *i.e.*, tillage and grazing. A singular lack of foresight and of sound State policy has characterised the manner in which Victoria and all the States have alienated very inferior grazing lands nominally for the benefit of agriculture, which were never fit for agriculture and in so doing destroyed some of the most valuable eucalyptus forests in the whole of the Commonwealth.

Having settled the question of classification and demarcation under the provision of the law, the next thing is to get appropriations fixed for a reasonable time. In most of the States these appropriations remained for many years at a figure ranging from £20,000 to £30,000 per annum. This was quite inadequate for the work to be done, as the controlling and protective staff had

to be paid from the limited vote, and any development and improvement work had to be met also from the same source.

In the case of the two Eastern Colonies, New South Wales and Victoria, and in Western Australia, provision has been made for special appropriations, not for a term of years, but as permanent provision which can only be amended by special legislation, subject to the proviso that half the revenue has to be devoted to forest work and the remaining half goes to the Public Treasury. Even so, the provision is quite inadequate in these States where a large amount of work has to be done, and I hope that for a fixed period of at least 10 years the bulk of the forest revenue will be devoted to forest work and a small nett surplus only, if any, will be paid into the Treasury.

The next question is that of independent control. Hitherto some of the States have not regarded this with much favour. They have preferred to keep the control of the forests in the hands of one official instead of a Commission, taking reasonable care that this official should be trained and well-equipped for the responsible and important duties he has to undertake.

New South Wales and Victoria rather less than a year ago each created a Commission of three members. In the case of New South Wales only two of the posts have been filled up and the third post is held temporarily by the Minister of Lands for the time being. This might at any time lead to complications of policy where the question of maintaining reserves is concerned. In the case of Victoria, the Commission was filled by the appointment of three officials having no connection with the Government in office. It has been claimed that in general policy, such as the matter of land settlement for soldiers, the Commission should yield to the Government of the day.

We recognise the influence of public opinion on forestry and the advantage of an intelligent and well-sustained propaganda, but I am bound to say this that while the public is intelligent and reasonably educated, it is on the whole not sufficiently alive to the importance of the maintenance of the forest reserves. That attitude may, and I hope, will be altered by a wider appreciation of the value of forests and by a better system of publicity. We have no such difficulty as has arisen in Canada and the United States. We have no great lumber companies which control in fee simple extensive tracts of forest, but there are companies which have long leases. Some of the leases will expire within a short period of time, and then, of course, we can and must exercise a stricter and more intensive control over their operations. They occupy valuable timber lands and have the sole right of cutting over them, but until the leases expire or compensation is given, the State cannot resume the areas which they are operating on.

The great difficulty which lies ahead of us in the future is the inadequacy of the reserves in some of the States. Tasmania, as Mr. Acland has just pointed out, has no forest legislation. It has on paper an area of about 11,000,000 acres of forest. I have traversed a great part of the country—and consider that of this

area about 4,000,000 acres, at most, is really good timber land, and should be dedicated as forest, but the advocates of forestry there have at present no strong public opinion behind them, and it is doubtful if even 3,000,000 acres will be reserved by the State Parliament.

The valuable forest lands of Western Australia, Queensland and Tasmania, will probably remain unreserved for a long period yet. In Eastern Victoria we have 1,500,000 acres of very valuable unreserved forest, the bulk of it stretching from the Snowy River to Cape Howe. In New South Wales there are about three-quarters of a million acres of forest of similar quality still unreserved: this also is unsafe in its present condition. The reserves of a natural forest of South Australia, which is mainly a rich agricultural State, are of small extent, some 300,000 acres, but this State of all the group has best developed her tree plantations, nearly 20,000 acres in area, most of which are extended and worked with great care. No matter what steps the Forest Commissions and Forest Conservators may take to render these lands safe for future generations, nothing of real value can be done without a strong public feeling at the back of them.

In two of the Acts, those of Victoria and Western Australia, provision has been made for the framing of working plans and for their maintenance, and there is also a provision that they shall be inviolate and that no Government shall touch them except with the consent of the Forest Authority. That provision we regard as of the first importance. Working plans which have been laid down to protect reserves can only be touched by formal provision in an Amending Bill, which, of course, is subject to public as well as parliamentary criticisms and may not pass into law. This has been the greatest advance we have been able to get in the practical working and administration of the forests, but the other colonies have not yet been able to make any such provision.

Mr. LEAVITT: We have in Canada two distinct classes of Governmental Forest Authorities. One is the Dominion Government, and the other the respective Provincial Governments. The field of the Dominion Government with respect to timber administration and protection is restricted to the Crown timber lands in the provinces of Alberta, Saskatchewan and Manitoba, and in the Railway Belt and Peace River Belt of British Columbia.

In addition to the timber administration, the Dominion Government has a policy of establishing forest reserves by classification. Field parties have been sent out from time to time during many years past with a view to segregating the area of non-agricultural lands and setting them aside for forest reserve purposes. These forest reserves are set apart by Act of Parliament, so that we have a very considerable degree of permanence and, as a rule, there has been very little attempt to disestablish them.

Not since the war started, however, have any new reserves been established, partly because Parliament was too busy during the war to pay very much attention to that sort of thing and partly because there were not sufficient funds available to provide

for the more intensive administration that is supposed to go with the establishment of forest reserves. Just now, the policy of extending the forest reserve area is stopped by the fear that the establishment of the large additional areas of forest reserve which really ought to be put through, might interfere with the scheme for soldiers' settlements which are under consideration by the Dominion Government. It is hoped, however, that many millions of acres of lands may, after careful consideration, be found chiefly valuable for forestry purposes, and will in a short time be added to the forest reserve area.

The Forestry Branch maintains at Montreal, in co-operation with the McGill University, a Forest Products Laboratory organised somewhat on the lines of the Forest Products Laboratory at Madison, Wisconsin, which is maintained for the United States Forest Service. This Laboratory at Montreal did very valuable work during the war and paved the way for the later work along similar lines done by the Forest Products Laboratory at Madison. However, as a result of the increased cost of living salaries were found to be inadequate, and the Forest Products Laboratories have been rapidly losing their personnel, and the organisation is rather sadly disrupted just at the present time. The matter is, however, under consideration by the authorities, and there seems to be some hope at least that the situation will be remedied.

One of the Forest Authorities, to which no great reference has been made thus far, is the Dominion Parks Branch, which administers the Dominion National Parks, primarily in the Rocky Mountain region, for the most part in Alberta and British Columbia. These Parks provide some of the finest scenery on the Continent and are visited by many thousands of tourists annually.

Then another Dominion organisation is the Commission of Conservation, to which brief reference has been made. The Commission of Conservation has undertaken to make a survey of the forest resources of the Dominion as rapidly as may be. The report for British Columbia has been issued and has been the subject of some favourable comment. We have another report under preparation for Saskatchewan, and the data is being collected for a similar report for Ontario.

Another line of work upon which the Conservation Commission is engaged is research work, the study of volume, the rate of growth and the conditions governing natural regeneration. We also are in co-operation with the Laurentide Company, Limited, which is represented here by Mr. Wilson, establishing some permanent sample plots in some of the plantations which have been made by the Laurentide Company.

Our investigating work has been carried on in co-operation with the Forestry Authorities in Quebec and New Brunswick, and with a number of the more important lumber and pulping companies of the Dominions.

The several provincial forestry organisations have been referred to before. We have a splendid forest branch in the Province of British Columbia, which is represented here by Mr. Grainger.

They have a very progressive policy and are getting excellent results. The Forest Branch there is in charge of all the lines of forest activity, timber administration, fire protection, collection of revenues, and so forth.

In Quebec we have a complete forest service and another in New Brunswick. In Ontario, as has been pointed out, we have a Forestry Branch which does not have charge of the timber administration. We are in hopes, however, that that situation will be corrected in the near future.

Nova Scotia, again, is without any practical forest organisation, and it is to be hoped that that also will follow the example of the other Provinces.

I wish also to refer to the splendid service which had been rendered by the Canadian Forestry Association, which is represented here by Mr. Black. The Canadian Forestry Association has done remarkably good service in educating the public on forestry lines and building up a public sentiment which makes it possible to get forest organisations established by the Provinces where they do not already exist.

Possibly that idea might help some of the other organisations in some of the other parts of the Empire. There are lots of things that an organisation of that kind can do, that cannot be done to advantage by a Governmental agency, and if close co-operation is maintained really excellent results can be secured.

(Lord Lovat at this point directed the special attention of the Conference to two questions arising out of the paper: the position of the forestry service in the Crown Colonies and the relation between forestry and the utilisation of timber.)

ORGANISATION IN THE CROWN COLONIES.

MR. BATTISCOMBE: The Forest Authority in East Africa has the control of the forests, and their powers are vested in the Conservator of Forests, who acts with the Chief Secretary to the Government in the Legislative Council. The Chief Secretary answers all questions in relation to forestry. In the preparation of the estimates, the Conservator of Forests makes out the estimates, he submits them to the Treasury, the Treasury introduces the blue pencil; they are passed on to the Secretary of the Government and then they are finally considered by the Government in the Executive Council. If the Treasury uses the blue pencil, then the Conservator of Forests is entitled to attend the Council and make what remarks he thinks fit. You have to submit your estimates first and then, after that, you have a fair hearing. So far, so good. On the other hand, the Conservator of Forests acts entirely by himself. The moment a question of policy arises the Conservator of Forests is invited to make his remarks, but if it is a matter of alienating land, in 99 cases out of 100 he is up against the whole Colony and he is going against a stone wall. As a result of that he rather loses all sense of proportion and cannot help the personal element entering into it. In all these arguments it is apparent, if there were some higher authority to whom the Government could refer and whose opinion would carry weight,

it would strengthen the hands of the Local Forestry Department and at the same time it would very materially help the Government.

Some time ago I suggested that a general Forestry Service should be established and an Inspector-General appointed, very much on the same lines as the Inspector-General of the Medical Service. He would be stationed in London in close touch with the Secretary of State for the Colonies; he might visit the various Colonies at periods of 3 or 5 years, he would then be at the disposal of the Governor to give him his personal opinion on all forest matters, and advise the Governor what economies could be effected in the superior and subordinate staff, also be able to give the Governor his opinion on the matter of exploiting the forest, and recommending timber legislation; he would also be able to control timber research and effect considerable economies in organisation of research. In London he would be of very valuable assistance to the Secretary of State. In many cases applications are made in London for forest concessions. All these applications have to be referred to the Colonial Government, much time elapses and a vast amount of correspondence generally accumulates. If there were some high Authority in London to whom the Secretary of State could refer personally, and a man or syndicate applied for a concession, they would be told practically definitely whether their proposition was a good one or that it could not be entertained.

Under present circumstances months' delay are entailed in close correspondence by letter and telegram and the matter does not seem to get much further. I am sure Mr. Ellis would bear me out in that.

It was suggested that the Crown Colonies should be put under one Forest Service. That appears to me to be the best way to do it. The larger the Service the better the Service, the larger the Service, the more chance there is of promotion, and every man would be more keen naturally on getting promotion. It would add zest to his work and, moreover there would be more higher paid appointments open to everybody. At the present moment there is only one good appointment in each Colony and the chance of anybody getting that appointment is very small. That suggestion was put forward to the Colonial Office by the Governor of the Protectorate; whether it has been favourably received or not I do not know.

Mr. THOMPSON: I certainly think that the problem of a broad forest service for the whole of the tropical Crown Colonies of Africa would be a move in the right direction; you would get continuity of policy and action if all the members came from the same school and were in the same service. At present there are a lot of little detached places and people recruited from anywhere, and there is no general *esprit de corps* or common point of view. If we are to get the best men for the Crown Colonies it should be a large service in which there should be some prospect of decent promotion, otherwise we will have to be content with the

dregs from the schools; only the men who are cast out from other places will come to us.

As far as Nigeria is concerned, we have been very fortunate in this; we have had systematic administration all through; both the natives themselves and the Chiefs have listened to our advice, and we have had every help from the Political Department in getting the reserves we want. But it is a long process and we cannot keep pace at the rate at which the forests are being destroyed. The service wants enlarging and it ought to be put on a sound financial basis.

One or two of the small Crown Colonies on the West Coast are in a very bad position now. For instance, in Sierra Leone, where the forests have been so ruthlessly destroyed that the water supply is being wasted and erosion is rapidly progressing, vast areas that formerly grew agricultural crops have now become absolutely unfit for that reason. Out of 30,000 square miles, most of which was originally covered with high forest, there are only about 1,000 square miles now left, and that has to supply the whole of the Colony with its timber.

Mr. ELLIS: Mr. Battiscombe has referred to an alternative to the proposal which I made at the morning session. I proposed a Committee; he prefers an Inspector-General. There are arguments in favour of both of them and they want to be fairly considered.

May I put some of the difficulties about the Inspector-General? He was to visit the Colonies and he was also to be at hand to advise the Secretary of State on proposals for concessions and similar things. I do not see how one man can do both, considering how many Crown Colonies there are and what a length of time it takes to get from one to the other. I think it will take a man all his time to go round once in five years, to the principal ones, if he is really to form his own idea about what is going on. In any case, he could not be continuously in London, and I think the delay would only be increased if we were going to refer any new proposal to him.

What you want in these matters is something to guide you in your day-by-day or week-by-week work, and that is why I wanted this permanent Committee which you could always have. If you could not have always all the members you would have some of them.

Of course, you could have an Inspector-General as well, but, personally, I rather prefer sending people out *ad hoc* to the Colonies, taking some distinguished man, say, from another Colony and sending him to a Colony where a special problem is presented, to report. Governors do not much like a sort of superior officer habitually coming round and criticising them.

Mr. ACLAND: That is just why you want him.

Mr. ELLIS: Yes, but we have to try to work with as little friction as possible; and I think they less resent a Committee

whose operations are more or less hidden under the ægis of the Secretary of State at home. That is a point to be considered.

Then there is the separate point that Mr. Battiscombe and Mr. Thompson referred to of the establishment of a General Forest Service. I suppose you could hardly do it for all the Colonies, but, say, for all the East and West African Colonies. There is much to be said for it in the way of presenting more opportunities for promotion, but there are also some difficulties. If people are to be considered in order of seniority it will mean such a lot of moving about from one colony to another, which is both troublesome and expensive. I think that if forestry receives the consideration which it deserves we shall soon have fairly large forest services, at any rate, in East Africa and Nigeria and possibly the Gold Coast also. I think it is the smaller places like Sierra Leone and Nyassaland where it is rather difficult to provide people with prospects, but you must bear in mind that the Secretary of State always has the power to promote a forestry officer in Sierra Leone to Nigeria, on what you may call the staff appointments, and it is a question to my mind whether that, if it were wisely exercised, would not really be sufficient.

Mr. C. E. LEGAT: In South Africa the forestry is of a "Topsy" description and it has now assumed considerable dimensions so that it has in it the elements of permanence. The forest reserves are also placed on a permanent footing; once a forest has been dedicated and set aside as a reserve it cannot be alienated without the consent of both Houses of Parliament, and to that extent we are on a sound footing, but our great difficulty is that for our work we can never count on having a regular supply of money. The Department is carried on by an annual vote from Parliament and, according as to whether the Union is prosperous or not, this vote is likely to increase or diminish, and that would be very upsetting to the Department's operations. This matter has given me a good deal of anxiety, and I must say I have not been able to arrive at any arrangement which will obviate it.

As regards a Forestry Commission, I have listened carefully to what Mr. Mackay has said about it, and I should have been glad to have heard a more definite expression of opinion from the Australian representatives as to whether they considered, as the result of experience, that a Forestry Commission was preferable to a Departmental Head, in whom all authority rested. It seems to me a drawback that the Commission is collectively responsible for the policy of the Department and, in a way, when responsibility is so divided, then nobody is responsible.

I do not know whether they find it easier to get their measures through and to obviate political interference by means of the Commission; perhaps one of the representatives of Australia will discuss this matter further.

Mr. MACKAY: On the point raised by Mr. Legat, as the representative for the Union of South Africa, I can only say this: The two Commissions in New South Wales and Victoria have

been established for so short a time that I can scarcely pronounce an opinion as to which is the better form of control. I may have a strong individual opinion and I can express it now unreservedly. I think from some points of view the advantages of a Commission are obvious.

I do not lay much stress on the point advanced by Mr. Legat that control by a Commission naturally means not only devolution of responsibility, but no responsibility. I take it that the creation of the Commission in the United Kingdom is the result of long and well considered judgment. I take it also that if the Parliament of the United Kingdom deliberately adopts a Commission as the best form of forest control, we, in Australia, are in good company if we have also adopted the Commission method of control. There is obviously some advantage in control under one official, whether Inspector-General, Conservator, or Director, and one of the main advantages I think is that you have a well-equipped man thoroughly fit for his position who decides ordinary matters quickly, while a Commission carries on its business at intervals by formal meetings.

I may say in one State the Commission is in this position: Two members have been appointed; they rarely hold formal meetings; there is a tacit agreement as to the division of work between them, and so far this method has worked well, and has resulted in the prompt despatch of all business matters. In the case of the other Commission, the three members meet regularly at rather short intervals. There is a tendency perhaps for rather too much detailed work to come before that Commission, but this is being altered. This would not happen in the case of one official such as an Inspector-General or a Conservator. On the whole, I am inclined to the view that where the population is large and where the forests are of a large extent a Commission must be of advantage, because one official cannot give that attention to a very large extent of forest and the numberless questions of policy which must arise in connection with the forests to the same degree as a Commission which separates and divides its work among the several members.

Sir MAYSON BEETON: Speaking for Newfoundland, we have been somewhat severely criticised and Mr. Acland said that while we had been a British Colony for three centuries, all that we had been able to do was to vote \$5,000 a year for fire protection. Well, I am afraid that we must confess to being even behind England. We in Newfoundland have no Forest Service and no Forest Authority, and I think, therefore, that we may fairly claim the donkey's prize as against the Mother Country. But there is some reason. Newfoundland was discovered by Cabot in 1497; he discovered the sea coasts which were developed for fishery purposes by the West country folk, mostly from Devon and Dorset. Until towards the close of last century the interior was almost unknown except by a few trappers and it was only when the railway was built that it came to be realised that there was a certain amount of forest wealth. Newfoundland contains only a small Forest Area as compared with the vast forest areas

that we have been discussing here, though even so it amounts to double I think of what you have here in the United Kingdom. We have about 10,000 square miles, *i.e.*, 6 or 7 million acres and while the growth is very small it has proved exceedingly suitable, not so much for lumber as for making paper, and there is a large enough area there to meet a large part of the requirements of the newspapers of this country.

The very able report which has been drawn up for Canada shows one point which the forest authority in Newfoundland, whenever it may be started, should first and last insist on, that is Fire, Fire, Fire. If you can eliminate the danger of Fire you have gone a long way to solve the whole problem of Forest Conservation and I am glad that in their report the Canadian experts say that the railway fire legislation there has been largely successful. I wish I could say the same thing in Newfoundland. I do not know whether any of the resolutions could include that, but I think that my Canadian friends will agree that the strongest possible legislation which could make all railways which run through forest areas responsible for fire prevention, would be of incalculable benefit.

But I should like to point out that while there is no forest authority proper as yet in Newfoundland it seems to me that the Newfoundland Government in the old days did very well by its people in regard to two matters of forest legislation. Nearly the whole population lives on the coast line and is engaged in the fisheries and accordingly the forest area within three miles of the coast—it is called the "three mile limit"—has been dedicated in perpetuity to the use of the fishermen and nobody may log or lumber there except the fishermen who have licences to cut timber to build their schooners and boats, and make their drying stages and barrels. That, I think, is a fine piece of forest legislation.

Another matter in which they were many years ahead of Canada was in refusing to allow the export of the raw material of the forests. They insisted if their woods were going to be exploited that they should get the benefit of the manufacture of the timber into lumber or pulp and paper within their own borders. The export of pit props or pulp wood from a country means the export of the forest capital with the minimum of advantage both to its wage-earners and its revenue. That is a very important point and in that way I think Newfoundland can claim to have been years ahead of Canada, which until recently allowed millions of cords of its best pulp wood to be exported to be manufactured into paper in the United States.

While associating Newfoundland generally with the remarks which have been made by the Canadian speakers, I would like especially to associate myself with what was said in regard to the education of public opinion. If we can get resolutions passed here and some data accumulated which will give guidance to the various local Legislatures of the Empire it will, I think, be very useful. It will be no good, for instance, passing Utopian

resolutions with a view to securing supplies of timber 100 years hence by means of regulations which would perhaps endanger the existing generation's wages and employment. For instance, take the regulations as to replanting now in force in Sweden. In Sweden, I think, every operator has to replant; for every tree he cuts down one has to go in. What is practicable in Sweden might not be practicable in Canada. That might be so costly that it would stop the installation of mills and arrest seriously the development of forest industries. You would never get voters to sanction such legislation or support it. They might rightly say, "we cannot sacrifice ourselves entirely to posterity; posterity has done nothing for us, we would rather get our wages and keep our families." I think, generally speaking, with regard to such resolutions as may be passed we ought to be very careful to remember how very different are the conditions prevailing throughout this Empire in regard to the forests and forest problems and to avoid the danger, so far as the self-governing Dominions are concerned, of putting forward recommendations which might very well be suitable, say, for India or tropical Crown Colonies, but which might entirely fail to secure the support of public opinion in the self-governing Dominions of the Temperate Zones.

RELATIONS WITH TIMBER INDUSTRIES.

Mr. M. A. GRAINGER: Our relation to the public in British Columbia is rather intimate in this way, that one-third of the public revenue comes from the forest and the public know it, and that gives us a certain standing with the community. If they do not give forestry enough support they lose money. Then the public know that we are mixed up with the market extension of the forest industries which I may say are major industries. I do not say it amounts to an awful lot, but the intention to help is there. We try to see where development can most usefully come; we are trying now to see how we can get the pulp business alongside the lumbering business and reduce the waste in our forests. So we hope to help a little bit in moving things faster than otherwise would be the case.

Then we have an intimate connection with the settler, who cannot get any land till our men have been there and looked it over. If there is too much timber a settler cannot get the land; and even if the timber is below the statutory limit he has to get a permit before cutting. Then we look after the cattle and sheep industries to some extent, because the Crown range, which is very extensive, has to be organised so that the grazing people can get proper use of it and the public can get its revenue. A man from one district cannot go with a bunch of cattle and crowd out another fellow in his home district. One piece of range should not be over-pastured and ruined and other places neglected. We come into intimate contact with a good many industries in that way.

Particularly I would like to say something about our relation to the lumbering industry. I represent the Coast Lumberman's Association of British Columbia here as well as the Government,

and I am speaking as a sort-of-betwixt-and-between-the-two. In 1912 when we were getting our forest service started after a previous period of chaos, during which the best timber had been partially alienated, I remember that the timbermen's associations when they heard that some foresters were to come amongst them began to pass resolutions to this effect: "Please do not put any academic persons to ruin our industries by impracticable regulations." Well, we started in and put in an administrative organisation throughout the province, and some of our foresters had an awfully hard row to hoe because they succeeded chaos when men did as they pleased. They were mostly young men. Well, they went through all the difficulties of the situation which you can imagine for yourselves. What happened next? The bulk of the timber in the provinces, the most valuable timber covering some 14,000 square miles had been partially alienated, but the Government had not said how much they would charge for it. This question of price came up in 1913. The Government wanted more money and thought it time the lumber industry paid a little more for their timber, in the form of a yield tax. So for a year there raged the most ferocious discussions as to how much these industries ought to pay for the timber they cut in those 14,000 square miles. During that discussion—I have a very vivid memory of it—the lumbermen complained of our lack of appreciation of their difficulties in cutting that timber. They said: "You are not in the business; you do not understand what we are up against." Like all young services we went through distemper like puppies, and we had the distemper of thinking that the one thing that really mattered in the world was the Government tax; that the more dollars you got into the Treasury the more you were performing your sacred duty to the community. It is only after reflecting that you realise there are other aspects of forestry to be considered.

The net result of that sort of thing was this: we were hostile to the lumbermen; they were hostile to us, and each side tried to get the ear of the Government.

I remember a little passage in that connection, if I may be personal for a moment; after this royalty business had been fixed up very satisfactorily on a sliding scale basis on the selling price of timber throughout the Province. (That figure is published every five years when there is a re-adjustment of the annual yield tax; the Government price of timber is made on the basis of that figure. If it goes above 18 dollars we get more money; if it goes below that it stays where it was.) One thing we had not provided for in this adjustment, namely, whether they were to pay for the small stuff. We thought we would try and compel payment for this. We had been waiting a long time to do it and in a weak moment tried to slip it over.

Then Committees began to come round and in the end I lost. It was a lesson to me. The lesson was just this; I was ashamed of my own action in the matter. Instead of going up and seeing those fellows in their own associations and saying "Here, boys, we think you ought to pay for this stuff; you think you ought not: can

we not thresh this out and have a compromise?" I tried to slip it over behind the scenes.

Another thing happened about that time. We insured the lumbermen to the extent of 50 per cent. against their fire operations, up to 50 per cent. of what it would cost them to fight fires. A man came to me and said: "What is the matter with you fellows; for three years I have had a claim; there is not any technicality your people have not used to prevent me being paid?" and he showed me where technicality after technicality had been raised in order to prevent him getting his money, and I blushed again. These two things brought us to this state of mind; that instead of playing against these people at long range we should get together and work out some sort of common basis. Most things are capable of adjustment once both parties meet and discuss them frankly. This sort of thing made one realise the value of frankness.

We found we are all interested together in getting our lumber business flourishing; our interests were not hostile really. We started out with fire protection; we got timber owners and loggers and lumbermen and said: "You elect representatives to a Committee with the Forest Service and that Committee will meet at regular intervals, and it will help in organising the fire fighting of the country every summer." We got that Committee going; our men carried out examinations of men to be employed; the results were submitted to that Committee which made its recommendations to the Government, and these recommendations established a feeling of confidence that we meant right as a Forest Service, that we are not taking money, half of which they subscribe, and using it for purposes they do not approve of; we are using it in what we think the best way to get the best efficiency and not from any academic view point.

Then we have a committee of all interests in reference to the extension of lumber markets. I will not bore you with these Committees, but there are a whole lot of them, and the net result is this that we have good feeling with each other; that the industries know that the Forest Authority means to be fair, that they bring us freely into their difficulties instead of fighting amongst themselves or with us.

As to forest land reservation: we have about all the law we want. We have a policy of non-alienation of any timber land. We have a complete concentration of forestry functions, and we have about as much administrative machinery as we want. In fact we have got more power than we have men of calibre to use it, and that is where the trouble comes in.

We have not done as much in land classification as we ought to, and we would have been doing it right now if we had the men; we should be investigating what is happening to the next crop if we had the men. Forestry reserves do not matter very much with us; the whole country is in reserve. But we have not made any differentiation of true forest land from other land because we have not the men.

Financially, we get a good deal of money out of the forest. We get about \$4,000,000, and we spend about \$750,000.

Efficient administration all comes down to this in the end : the status and the salaries of the men employed. Well that is where the human problem lies. We are short of men. We do not know how to keep them. It is very largely a matter of pay. Enthusiasm peters out after a few years. If a man knows he is under-paid, and he is to get no reward for good work and no black mark for bad work, he is apt to look elsewhere for employment.

The lesson to be driven home is just this : What is the method by which we can achieve further progress? It will come through honest sustained publicity, so that public opinion will have a respect for what foresters are trying to do, and will support them and make their living conditions such that better men may be enlisted in the cause.

Mr. PONSONBY : I am afraid the history of Irish forestry is not very glorious. We have in Ireland about 20,000,000 acres of land, of which about 288,000 are forest; of that amount 8,000 acres belong to the State, the remaining 280,000 are privately owned, and mostly planted 100 or more years ago. Of recent years there has been practically no private planting, the only planting that has been done, except in a few instances, being of course by the State. The reason for that, I think, falls under three heads. The first and most important is the lack of any continuity in the policy of the Government. If experience gives wisdom, then I think I can say the most experienced of you gentlemen from the Colonies is a mere child compared with what any Irishman is as regards lack of continuity in Government policy. It has not been approached by anything; the completeness and rapidity with which the whole political picture has changed in Ireland, and that has had a very bad effect on everything.

The second reason I think may be called the mentality peculiar amongst Irish people. Our people are very prone to look backwards and never forwards. Ninety per cent. of an Irishman's thinking time is devoted to the past, generally a very imaginary past, and perhaps the remaining ten per cent. refers to the future, which may also be very imaginary.

A third reason why so little planting is done is what in any other country would be purely a practical reason, but in Ireland it is rather political, and that is the relatively high value of grazing land. It is quite extraordinary the value of rough grazing land in Ireland, and that again is due to several reasons. Perhaps the chief is this, that in troublous times—which the times in Ireland always are—it is better to rely on yourself than on anybody else, and, of course, if you are grazing you rely only on yourself, whereas if you are going in for forestry you have to have a good many employees.

Another reason is that there is no demand for the younger class of timber. In England it goes in pit props. In the Colonies it probably goes to pulp wood, but in Ireland there is no demand for it. The carriage on pit props to England is too great and of course there is no wood pulp industry, and the result is that

our woods do not become really profitable until too long to encourage people to go in for any extensive planting.

But the chief thing really is the mentality of our people; the people do not care about forestry; the rewards of forestry are too remote. I think nothing will remedy this except publicity; what Mr. Grainger referred to as honest, sustained publicity, and I put a good deal of accent on the word "honest." Indeed, I may say for Ireland that our only hope of taking any interest in this matter is if you gentlemen take an interest and manage to get a regular sustained effort throughout the Empire; then we may be able to get our people to look at what you are doing and possibly to copy you. That, to my mind at any rate, is our only hope.

SUMMARY.

Mr. R. L. ROBINSON: I understand I am to attempt in some way to sum up the discussion which has gone on to-day. I should like to say, first of all, that I have been immensely struck with the very high level of the debate.

It seems to me that there are certain leading principles which emerge from this discussion, and the first of them, I think, is this: That forests are a national asset. That is the first and fundamental principle. Until it is recognised there can be no forestry, and precious little in the way of a Forest Authority. As to the importance of forests as a national asset we in the United Kingdom have at any rate learned during the war that a Nation or a State should contain within its own boundaries sufficient timber reserves to enable it to carry on over at least a limited period in case of emergency. That is the second principle.

The next point, I think, is this: That certain soils are undoubtedly better suited for forestry than for agriculture, and the application of that principle, of course, leads to land classification, and from land classification to the dedication of forest reserves, or whatever local name is applied to land dedicated to forestry.

The fourth principle is this: That a Nation, a State, holds its forests not as an absolute property which it can dispose of absolutely at will, but as a trust, and it is only when the conditions of that trust have been formulated that rational forest management becomes possible. The formulation of that trust is effected, of course, by legislation.

Another principle is this: That State ownership and State management, as a rule, is calculated to give the best production of timber. I do not mean by that that State ownership is the only ownership or the best ownership under all conditions, but just this, that given State ownership you can get that continuity of policy which is essential for systematic management and for timber production in the highest degree.

And, finally, I think we all agree on this principle, that it is essential in forest policy to have an *ad hoc* Authority, that is to say, an Authority which is adequately equipped with powers and duties, an Authority which very often has not, but which ought to have, a definite programme of work, an Authority which is

secure in its finance, so that it has not to live a hand-to-mouth existence, and, finally, an Authority which is adequately staffed, staffed by men of the right sort, properly trained, properly paid, and with a recognised status in the social life of the Community.

That is as well as I can summarise the discussion as it has presented itself to me, but I reserve one point, and that is the difficulty of getting at Ministers. I have found it myself, living here in London and with the right of appeal directly to a Minister, very difficult to get anything done, and when I was thinking that over, I tried to imagine what must be the position of a Colonial Forest Officer who wants to get something done. He is tucked away in some corner of the Empire, very often in a bad climate, and apparently, between him and getting something done, there is first a Treasury Official; he squares the Treasury Official in some way; he goes to the Legislature possibly to square the Legislature, but that is not likely, and finally there is a Governor who has a veto of some sort, or at any rate in respect of forestry, the power of doing nothing well developed. Presuming, however, he gets through all that red tape he has still got the Colonial Office to get through, and he probably approaches the Colonial Office as I did a Whitehall Office when I thought of going into the Indian Service, with fear and trembling. The buildings themselves are impressive, the Officials are doubly impressive, and I can imagine a Colonial Officer coming home and feeling very dubious indeed, as he walks up Whitehall, of getting a favourable answer to his proposals.

I am sure that under the circumstances all the foresters will agree with me that it would be a wonderful thing if the Colonial Services could be stabilised in some way, their status improved, and if the interchangeability of posts, which is now an essential for rapid progress, could be arranged. I am sure that we all hope that out of this Conference something at least of that sort may emerge.

THIRD DAY.—Tuesday, 13th July, 1920.

PROBLEMS AND METHODS OF TECHNICAL FORESTRY.

Mr. R. L. ROBINSON: In placing this paper before the Conference, it is necessary to explain that the Forestry Commissioners, in drawing up the agenda, thought it desirable, while confining the discussions mainly to questions of policy, to afford an opening for an interchange of views on technical problems and methods. In continuation of that idea, it is now proposed not to attempt a survey of the whole range of technical problems and methods, but merely to group the problems under convenient heads and to indicate the lines on which they are being approached in the United Kingdom.

It seems possible in the first place to divide the whole range of problems into two parts, which may be described as—

- I. External to technical Forestry.
- II. Internal or Inherent.

By *external* are meant those artificial problems which are outside the control of the forester in the execution of his technical business. They include such subjects as the reservation or acquisition of land for forestry purposes. They have been fully dealt with in the earlier subjects ("Responsibility of the State for Forest Policy," and "The Forest Authority") before the Conference, and beyond noting that until these problems have been settled, the technical business of the forester is often rendered extraordinarily difficult and unsatisfactory, it is not intended to deal with them further.

This definition clears the way for dealing with the "*Internal problems*," which may be described broadly as those affecting the processes of timber production. They may be grouped as follows:—

1. *Regeneration* (including for convenience the establishment of crops by artificial means).
2. *Treatment* from the stage when the crop is regenerated to the time of exploitation.
3. *Exploitation*.
4. *Protection* of the forest against damage from trespass, fire, insects, fungi, &c.

1. REGENERATION.

(a) *Natural regeneration* is, and must remain for a very long time, the method by which the bulk of the forests of the Empire are renewed after exploitation. Success is in no small measure bound up with the system of exploitation, and, unless the forester can control that system, his chances of securing successful natural regeneration may be very small. But given control, what are his problems?

The presence of a sufficient number of good mother trees to provide seed is, of course, the first, and it has to be determined what constitute good trees for the purpose, and the requisite number of them. A suitable seed bed is the second desideratum, and subsequently the regulation of light to the young trees, protection against frost, drought, &c. (and, of course, fire and trespass), and against other undesired species. There is no royal road to the solution of these problems, which differ with every species and set of conditions. Systematic observation and experimentation will in due course solve the problems, but even when a specific problem has been solved, the cost (both in time and money) has still to be counted and balanced against artificial regeneration. In the United Kingdom, for example, we could probably do quite a lot of natural regeneration if we were content to wait 20-30 years for a full crop, but our area is limited and time

is an urgent consideration. In 20-30 years we hope that most of our coniferous timber will be getting on towards pit-wood size.

(b) *Artificial Regeneration*.—The problems arising out of planting work are among the chief of those facing the Forestry Commission in the United Kingdom. They are numerous and a few of them only are stated below :—

Choice of Species : A difficult but fundamentally important matter and often in the last analysis a question of personal taste or fashion. The choice often lies between " safe " indigenous or well-acclimatised species and exotic but more rapidly growing species. The problems may be summed up as the assessment of production in volume and value and of risks to which the choice will be subject. The safe basis for such assessment is the collection of data.

Typical examples in the United Kingdom are Larch versus Spruce, and in detail Norway spruce versus Sitka spruce.

Nursery Practice : e.g., The best description of plant to raise and the cheapest way of raising it.

Method of Planting : For varying conditions.

Spacing of Plants : In the United Kingdom 6 feet is considered wide spacing for conifers. The data for making a reasonable estimate for different species are not available.

Replacement of Failures : How far it is necessary, with what species and when.

Weeding : How far plants can look after themselves when planted under varying conditions.

The Forestry Commission are attacking these and allied problems by a series of systematic experiments, which have as their object " the cheapening of the cost of establishment of successful plantations of the most productive species."

2. TREATMENT.

The main problem for consideration is thinning practice. It is not proposed to go into it in detail as the theory is set out in most textbooks. Thinning practice is conditioned to a great extent by markets, but even so there are occasions when it pays to thin though the operation in itself is conducted at a loss.

It is possible in some measure to group species in respect of their response to thinning, but the safest plan again is to found practice on careful experimentation.

A problem which will have to be faced in the United Kingdom, where it is necessary to raise up a reserve of saw-timber as quickly as possible, is whether a certain proportion of the State woods should not be widely planted and heavily thinned at the expense of the quality of timber produced.

3. EXPLOITATION.

Assuming that the logging, conversion and marketing of timber lie outside the scope of this paper, the most urgent problem to the forester is the regulation of the yield. On the one hand his ideal is to ensure that the forest is not over-cut, and is adequately regenerated; on the other hand he is pressed to meet the more or less conflicting interests of the exploiting party. Just regulation of the yield entails knowledge of the state of the forest, *e.g.*, the distribution of timber classes and the current increment. Surveys of growing stock, the assessment of "qualities of locality" and the compilation of yield tables have consequently to be undertaken.

In the United Kingdom, where the forest areas are small but the working intensive, we have Ordnance Survey maps on the scale of 6 inches to the mile to work on. A first assessment of the rate of growth of conifers under varying conditions has been made, and preliminary tables have been drawn up for a number of species.

4. PROTECTION.

Protection problems confront the forester at every turn. Protection, of course, can never be absolute, but it seems sometimes to be a question whether it would not prove more remunerative to protect relatively small and valuable areas efficiently rather than to attempt to protect very large areas indifferently.

I hope that the delegates will indicate to us how they are dealing with such important subjects as the following, which are common in some degree to all countries:—

1. Grazing and ground game.
2. Fire.
3. Insects and fungi.

In the United Kingdom ground game (rabbits) is a pest which costs the country very large sums annually. In very many districts it is useless to plant unless the plantations are netted against rabbits, and wire-netting now costs at least 45s. to 50s. per roll of 50 yards. A satisfactory method of protecting young plantations in the Highlands against deer has also to be found.

Fire.—The fire danger is normally not serious, but will doubtless become so as the area under conifers increases.

Insects and Fungi.—Insects are at present relatively numerous—especially bark-dwelling insects—owing to the recent heavy fellings. These we believe we can control by sound forest hygiene, but one of our problems is to keep our two valuable exotics Douglas fir and Sitka spruce free of insect pests such as the *Chermes*, which plays havoc with the common Silver fir.

Of fungi the white pine blister has rendered it inadvisable to plant Weymouth pine; the Larch canker does a great deal of damage, and still offers a field for experimental investigation.

CONCLUSION.

In conclusion, it may be stated that the problems of technical forestry are large—in time, in space and in numbers. The general method, which foresters for the most part are employing, is the scientific or statistical method. This implies systematic investigation, the compilation of records over long periods of time and the application of observed phenomena to everyday practice. The forester is attempting to penetrate the secrets of Nature, and one by one, as those secrets are learned, to turn her untamed forces to useful account. He may be defeated a thousand times, and nowhere, indeed, is man's tenacity of purpose more clearly needed, but our efforts to date, though comparatively young, have already met with sufficient reward to warrant the expectation that we may confidently hope for large and striking success in the future.

I will now refer in further detail to the question of seed supply in which we are all of us interested. In this country we require supplies of seed of Douglas fir and Sitka spruce, of which, as we know, there are vast forests in British Columbia. We also require a supply of seed of Corsican pine, which, Mr. Mackay informs me, the Victorian Government requires as well.

One of the results of this Conference ought to be to organise those sources of supply. If the Imperial Forestry Bureau comes into operation, one of its obvious functions would be to secure that year by year each part of the Empire should state what seed is available and make preparations to collect what seed is required. I can see certain difficulties in the way, but I think, nevertheless, that we could do a great deal in that direction, and instead of British Columbian seed going to the Continent to be retailed at a profit to us in the United Kingdom, in New Zealand, Tasmania and Victoria, it might just as well go direct.

The CHAIRMAN : I suggest that we should discuss the question of Regeneration under the heads of Natural Regeneration and Artificial Regeneration, and then the question of Treatment and Protection and then the question of seed supply within the Empire.

REGENERATION—NATURAL AND ARTIFICIAL.

Professor R. S. TROUP (India) : Our experience now in India is in the direction of artificial as against natural regeneration ; not that we have not a firm belief in natural regeneration, but simply because our methods of working are tending towards concentration rather than towards the diffusion of work, as being more economical and more practicable. From that point of view we have found by experience that artificial regeneration is often easier to effect and in many cases is cheaper than natural regeneration. Similar problems must be occupying the attention of foresters in tropical countries outside India, and our experience in India may possibly lead them by a short cut towards progress

This leads to the important question of a journal of tropical forestry. In India we have had a journal, "The Indian Forester," which has been in existence for upwards of 40 years, and has been an invaluable storehouse of information and medium for the exchange of views. Now, the tropical colonies, generally, are too small to be able to run their own journals. My suggestion is that, if we had a Journal of Tropical Forestry for the whole Empire, we should be able to accumulate a vast amount of useful information and to keep each other up to date in the progress that is going on in different parts of the tropics. The details as regards such a journal would have to be worked out; I merely make the suggestion in the hope that it will be supported by the majority, if not all, of our tropical colonies.

Mr. C. E. LANE POOLE (Australia): In the Commonwealth of Australia there are really only two States which have reached that stage where problems of natural regeneration are being tackled. In the other four States we are still frankly in what Mr. Robinson has called problems which are external to technical forestry, namely, the reservation of the country.

Right through the Continent the regeneration of the eucalypt species is exceedingly good. After the lumber men have finished their cutting, in the course of a couple of years, the regeneration comes up extraordinarily well, but the difficulty has been to maintain the young crop which grows up. The grazier and other individuals set fire to the country, either for grazing purposes or merely to burn country that will burn, and the young regeneration is ruined. In certain States the timbers are sufficiently resistant to fire to withstand in some degree these continual burnings, in other parts the young growth is entirely destroyed. The problem, therefore, in most of the States is primarily one of fire control, which we are going to deal with later on.

The main problem—putting aside the fire control question—is to get rid of the superabundance of much over-matured timber which is useless for any purpose except firewood. With a small population, such as Australia possesses, it is obvious that we must find great difficulty in marketing this class of timber. All we can hope to do is to try to preserve from fire, as far as we can, the young growth that does come up. The young growth will not be good, because of the canopy of over-matured timber which is standing over it, it will be suppressed to a large degree until the time comes when we can get rid of that over-matured timber.

Mr. H. R. MACKAY (Australia): I need only confirm what Mr. Lane Poole has stated as to the difficulty through forest fires of maintaining natural regeneration in the eucalyptus forests of Australia. Such regeneration is exceedingly good under ordinary conditions, but when severe fires sweep through a forest and burn not only the humus but the subsoil there may be large areas on which no further reproduction occurs for a period, a proof that while light fires are useful in regeneration work, immense

damage is done by severe fires, which can only be repaired by re-planting. Wherever in the lower areas the natural forest has been denuded by bad work and over-cutting, especially during the early goldfields settlement, we have had to replant, and in such cases it is a choice dependent on soil and rainfall whether we utilise conifers or restore the eucalyptus. Wherever the rainfall is good on the lower foot-hills we encourage by natural regeneration crops of eucalyptus, and in the lower areas near sea-level we plant conifers.

With us planting is much more expensive than natural regeneration, and wherever possible, notching is employed in lieu of pitting.

Mr. ELLWOOD WILSON (Quebec) : The areas in Canada are so large, the distances are so great, that it is absolutely impossible on the areas of Government-owned land to undertake artificial regeneration. On the other hand, the question of natural regeneration, which I have studied in the forests of Quebec for the last 15 years, is a very difficult one. Most of the areas which are suitable for natural regeneration are areas which have been burnt over. In those areas we find the seed is very small indeed, in some cases it takes over 50 years to secure anything like a crop of coniferous wood. Another difficulty in naturally regenerating our lands is the large number of weed species—that is, species which are at present to be regarded as weeds—owing to the difficulty of transport, and that is a question which probably will never be any better for the inaccessible areas, although the construction of railroads in the future will be a help. But the great difficulty is that the stand of those areas will probably never pay for building railroads into the bush. In the case of natural regeneration it very often happens that the coniferous species come on for a time very successfully, and then they are either too crowded or the insect danger becomes so great that it is very difficult to handle the areas.

Studies made on the cut-over lands in co-operation with the Commission of Conservation show that while on the average over large areas the natural and original stand was about 540 cubic feet per acre, it has been proved that after 50 or 60 years the natural regeneration on cut-over land will only yield about 135 cubic feet per acre, which you can readily see makes this land impossible to exploit from a commercial point of view. On the other hand, if you begin planting operations you are able to concentrate your plantations somewhere near the source of utilisation, that is to say, somewhere near your saw mills or your paper mills, and the probable rate of return will be somewhere in the neighbourhood of 2,700 cubic feet per acre as opposed to 135 from natural regeneration. So, from an economic standpoint, it seems pretty certain the best proposition is to select areas of cheap land as near saw mills as possible and begin planting. On the large areas which are in forest to-day, probably the only thing we can do is to keep fire out and on the areas near the railway try to find

some methods of utilising the hardwoods as well as the coniferous, so as to utilise everything standing and leave the ground available for the best possible natural regeneration.

Mr. D. K. S. GRANT (Conservator of Forests, Tanganyika Territory) : I wish to speak, with Mr. Battiscombe's permission, of the conditions in British East Africa and the Tanganyika Territory, in which two countries, and probably in Uganda and Nyassaland, the conditions are very similar. The chief difficulty with which we have to contend is inability to control adequately methods of exploitation because shortage of staff and funds debar departmental working. Private enterprise, therefore, exploits our forests. The Forest Department marks all fellings, which should be in itself almost sufficient, but for the following reasons is not so.

All our forests, excepting plantations too young to exploit, are virgin and of a most irregular nature. On almost any area are found many species of no present value commercially, and even among the merchantable species usually 50 per cent. are either over-mature or suffering from defects, or are in the sapling and pole stages of growth.

The milling firm has to contend with great difficulties in extraction of timber due to the configuration of the ground, difficulties of transport owing to bad roads, great distances from the railways and high freights; and there is no market at present for any timber excepting the best logs in the bole of a tree.

For these reasons the milling firm will only agree to purchase the species they are sure of being able to dispose of, and they naturally try to obtain only the best-grown specimens of these; and it is difficult, and in some cases impossible, to make the lumbermen clear up the slash resulting from fellings.

It will be understood, therefore, that the Forest Officers cannot mark a felling as it should be done with natural regeneration in view. Even if seed does reach the mineral soil and germinate, the seedling cannot penetrate the mass of débris lying about it. This is at present our chief problem which needs solution.

Mr. A. J. GIBSON (Conservator of Forests, India) : I should like to say a word or two about Northern India.

Professor Troup, in his remarks, referred more especially to tropical India, where it is possible that natural regeneration is difficult to obtain, especially in Burmah, where only one species out of many can be utilised. In the Himalayan Coniferous belt, which extends over 9,000 square miles or so, as also in the Sal belt of North-west Indian and the United Provinces, all our efforts recently have been concentrated on a system of working the forest which will induce natural regeneration. The coupes, or felling areas, are large and the cost of plantation excessive. The labour supply is small. The last three coniferous working plans with which I have been more or less connected have all aimed at the system of shelter woods, with natural

regeneration; we could not go in for extensive plantations in Upper India.

Mr. THOMPSON: In Nigeria, in the dense evergreen tropical forests near the coast, natural regeneration has proved to be a very costly operation. Those forests have been worked under the selection system and regeneration is necessarily of a very scattered character, and it is impossible to exercise supervision. As the result of these difficulties we have found it much cheaper and in every way preferable to go in for artificial regeneration. We have got some extensive teak plantations now, which grow very well indeed and promise to have a great future before them. We have endeavoured to locate them close to the large centres of consumption. By such an arrangement we shall be able eventually to reduce the area under forest because the work is concentrated.

I think this will be one of the solutions of our problem of getting enough land under forest growth to supply timber. Other species (the mahogany, for instance) are more difficult to regenerate, but *Sarcocephalus esculentus* and two or three terminalias have proved very satisfactory. Their growth is all that can be desired. They shelter the ground very well in their youth; the thinnings, if the plantations are made close to centres of consumption, are remunerative, and I hope that a well-laid planting policy will be carried on systematically in the future.

Mr. ROGERS (Conservator of Forests, Trinidad): The problem of regeneration in the West Indies is very much the same as in all other dense tropical forests. We began by open plantations, but we found that far too expensive a method except in the case where we could make use of the local system used in establishing cocoa plantations, that is, payment by results after a five-year period during which the contractor gets a certain amount of agricultural produce from the land while growing the trees. Our best results have been by shelter-wood plantations where we leave a light cover and sow in patches after a certain amount of preliminary clearing and burning of the debris, and by that means we get fuller stocking at very much less cost than by the open method. Natural regeneration in the forest without assistance is in most cases almost non-existent. In one or two cases we had a very unusual thing which occurred only once in 30 years—a forest fire. We got a good crop of cedar and our great problem was to keep that from being smothered by forest weeds by the method of improvement fellings.

Mr. C. E. LEGAT. (Chief Conservator of Forests, South Africa): Our forests in South Africa are composed of many different species, of which perhaps only half-a-dozen are at present of economic value. When our forests are cut over we find that natural reproduction is often very inferior, and we are very ignorant at the present time as to what degree of felling is necessary to ensure the best results in reproduction. The fact

of the matter is we are very ignorant of the life history of our trees: before we shall be able to regenerate our forests satisfactorily it will be necessary for the Forest Department to make extensive studies of the life history of the trees and their growth in the forests.

As far as the establishment of plantations is concerned the practice in South Africa is probably different from what it is in other parts of the world. We find that to show a satisfactory result it is absolutely essential to destroy the natural vegetation on the ground either by ploughing or, where the ground is too rough or irregular to permit of that, by picking the surface over. Very often by reason of the sour nature of the veldt it is necessary to leave the ground fallow for a period of a year or more after the preliminary cultivation. This practice has only been established as the result of trials over a long period of years, but it is now definitely followed, and previous methods which were unsatisfactory have been abandoned.

Mr. G. E. S. CUBITT (Conservator of Forests, Federated Malay States and Straits Settlements): I should like to say one or two words with reference to conditions in the Malay Peninsula, which is essentially tropical. Mr. Troup has suggested that some of us might from experience in India go straight for artificial regeneration. I cannot help feeling that the choice between natural and artificial regeneration depends on a number of factors, each of which has to be considered. Some of those factors are the supply of labour, the cost, the species which is to be dealt with, and, in my experience, luck. As regards labour, the reason, as I understand it, that in India it is possible to embark on a large programme of artificial regeneration is that in India there are jungle tribes who live by shifting cultivation and who grow in their *taungyas*, as they are called, the trees it is desired to raise in conjunction with their field crops; the native cultivator, in short, works with the Forest Department. But there are few such tribes in the Malay Peninsula, or, those that there are, are so scattered and so unamenable to discipline that artificial regeneration by their aid is out of the question on any scale. With artificial regeneration we can, in the great majority of cases, make certain of success, but it is very uncertain what the cost of that success will be. To take an example, it is most important to us that we should secure rapid and complete regeneration of our mangrove forests, and certain experiments have been made from which it is perfectly certain the most magnificent results are obtained by artificial regeneration, but in order to secure those good results it seems to be necessary to plant extremely closely. If we plant at what would be a reasonable distance apart the crabs come in and we lose almost everything, so we have to begin all over again.

We have found in the Malay States that a system of repeated improvement fellings has been extremely successful. I wish I had the figures here. We have small areas of camphor forests—

not the Formosa camphor—in which a series of repeated improvement fellings has been made and that forest compares favourably with the finest beech and oak forests I have seen in Europe; the crop of camphor is so thick that I do not believe in any part you can see more than a couple of yards. We have also obtained a more or less similar result with other Dipterocarps, but here comes in the question of luck, for everything depends with us on striking a seed year.

The fourth factor which has to be considered is the species. This means a study of the life history of the tree, so that the whole thing really comes back to research.

The HON. E. LUCAS (Agent-General for South Australia) : I notice that one of the Delegates from Australia, speaking on the question of regeneration, said there were only two States which had done anything in the matter. I do not know whether the speaker included South Australia which has had a Forestry Department for the past 44 years. We have 160,000 acres of forest reserves and plantations. We have also a pine forest planted 25 years ago, and to-day the trees average 20 inches in diameter, and 100 feet in height. It is 2,500 feet above sea level and has an annual rainfall of somewhere in the neighbourhood of 30 inches. So the Conference will see that there is one other State in Australia that is doing something for Forestry.

There is another direction in which the State which I represent has done better than any other State in Australia, that is in its generosity in giving away trees to all and sundry who ask for them. We have been giving away trees for the past 37 years. We have given 10 million trees to 55,000 applicants: farmers, gardeners, or residents of towns. All they have to do is to apply to the State Officer, and they can get them simply for the cost of carriage. I mention that to show that in the State of South Australia we are alive to the imperative necessity of the regeneration of our forests.

MR. LANE POOLE : I wish to explain the remarks I made in regard to Australia. I was dealing purely with natural regeneration, and natural regeneration only; I was not dealing with planting at all. Natural regeneration and planting are quite apart. I should say that no State has done more for afforestation, as compared with natural regeneration, than South Australia. She has done large plantation work, and, in this direction, she probably stands first with regard to that work.

PROBLEMS IN THE UNITED KINGDOM.

MR. DUCHESNE : The difficulty that we have to contend with in this country first is the extraordinary variation of local conditions that you have in various parts of England and Wales. There have, as you know, been many attempts in the past, successful in some cases, to re-establish crops by natural reproduction. You see that in the case of the Scotch pine in the southern counties: but in most cases the difficulty that we

have experienced is in sufficiently controlling the preliminary steps necessary for that successful natural reproduction.

The extraordinary successful regeneration results of Scotch pine on Speyside, which the Delegates will see, was successful largely on account of the preliminary steps taken by Mr. Grant Thompson to see that he had proper soil and surface conditions before the felling took place and the seed was scattered. We have had in the past more or less successful results in the oak woods of Sussex and in some of the areas in the south-eastern counties we rely on the natural regeneration of oak, but that is very limited in success when you come to open high forests.

In the Forest of Dean, which is the best instance we have in the whole country of the natural reproduction of oak, we saw how disappointing were the results, even although at first they looked extremely encouraging. The natural reproduction of oak in those woods has been successful in the past, but has been seriously handicapped by reason of rabbits and by not taking precautions to keep a proper stock on the ground. But this question of natural or artificial reproduction is of the greatest importance, and I sincerely hope that the Forestry Commission will give us as much collected knowledge as is obtainable in this country, so that we can put it to use and distribute it among estates.

MR. A. C. FORBES (Assistant Forestry Commissioner, Ireland): I must perhaps correct an impression that Mr. Ponsonby gave you yesterday with reference to the state of Ireland. The state of Ireland to-day is only what Great Britain will be to-morrow. We have in Ireland three great pests—the grasping grazier, who really covets the land before you have got it, and takes its possession away from you; the greedy goat which eats everything, bud or leaf, as soon as it comes up; and the rapacious rabbit. Those three things are particularly virulent in Ireland.

Mr. Robinson stated that our efforts should be directed to protect the best areas. That particularly applies to Ireland, where we have the finest soil on the earth and the finest climate in the universe.

In Ireland the farmer's whole aim is to convert the countryside into a dismal waste of grass, and he leaves the forester absolutely nothing but a few odd patches here and there, and a few odd bits of waste land. That is coming to you all sooner or later. We have the first brunt of it. You will be the next, the Colonies next; it is no good shirking it; I think we must look forward to the problems before us.

MR. W. H. GUILLEBAUD (Forestry Commission): The experiments which we are carrying out in this country are starting in the nursery. One of the first questions we are tackling is the question dealing with the germination of seed; we are trying to standardise the methods of testing of seeds, the question of germinating capacity and germinating energy. Having found

out the germinating capacity of any stock of seed, the next question is how to get that seed to germinate rapidly and to produce a strong strain of plants. We are trying experiments to stimulate and accelerate germination. So far we have got very few results. One place where we had results is an example of larch which was treated with hot and cold water for varying periods. It is perhaps interesting to note in this particular case the untreated seed gives the best germination and the best plant, and none of the seeds soaked in hot water or cold water for various periods of time germinate so well. Then we are experimenting with the problem of whether we should broadcast seeds or whether we should sow them in drills. There we have not yet got any results. Then we are also testing the question of the shading of seedlings in the nursery, and also the question of how far it is necessary to weed seedlings.

Another problem we are faced with in England is the question of Corsican pine. We propose to use that in the sandy soils and in the southern parts of the country. It is very difficult to transplant, and we are at present conducting experiments as to the time at which we ought to transplant and the age. Finally, the question of the organisation of planting is an important question, and we hope to be able to some extent to standardise planting operations. The Americans have applied the time study to industrial operations, particularly to engineering, with remarkable results, and we hope by making similar investigations on planting operations to obtain useful results.

PROFESSOR STEBBING (University of Edinburgh): I wish to emphasise the importance of nursery practice, as, owing to the high cost of plants and seed, it seems to me that very considerable savings can be effected even by a very small nursery.

With reference to spacing, there are two instances in the Forest of Dean. In one plot, in which 200 Douglas were planted in 1903, three trees were found to be 60, 57 and 50 ft. high, while the majority were comparatively small. This is an extreme instance of the extraordinary variation in the growth of Douglas in this country. Presumably it can be got over by correct spacing, and, of course, subsequent careful attention to the wood. The wolf trees, as the Germans call them, will undoubtedly have to be got rid of at a very early stage. Secondly, in the Abbot's Wood there is a plot of young spruce planted 2 ft. 6 ins. apart about 12 or 14 years ago. There the branches are quite small—twice the diameter of a lead pencil—and dead. Now, the question with spruce in this country is how to make the lower branches die. In this damp climate they persist for a very long period. So far as pit wood goes, you want to be able to produce the stuff we import from Norway, Sweden and Finland. You see it growing there beautifully straight and clean as anything, of pit wood size. I have never seen it like that in this country, except in that little plot in the Abbot's Wood.

SIR HUGH SHAW STEWART (Consultative Committee for

Scotland) : I have seen both Douglas and Japanese larch showing very much the same results as here quoted by Professor Stebbing, and I have ascribed it to the trees having been planted too close, viz., at $3\frac{1}{2}$ ft. apart. A few dominant trees got away, and both Douglas and Japanese larch in two different plantations measured from 25 to 34 ins. at breast height at 18 years old. Those were the dominant ones; the others were miserable, spindly specimens.

Bulletin No. 24 from the Forestry Division of the United States Board of Agriculture points out that the same thing can happen in natural regeneration, and that it is not very unusual to come across an area of young trees of even age where growth has almost entirely stopped, all the trees being sickly and undersized owing to their crowded condition.

Now, it does seem to me, if that is a problem which they have to meet and fight against in natural regeneration, that it is foolish of us to bring about a state of things artificially. Therefore, I have come to the conclusion that for Douglas fir and Japanese larch we ought to plant somewhere about 7 ft. apart, and Sitka 5 or 6 ft. apart.

SEED SUPPLY.

MR. GRAINGER : Mr. Wilson says that he will supply, as far as he is able, some seed of *Picea Canadensis* and *Pinus resinosa*. We will also supply seed from British Columbia, not because we want seed ourselves in exchange, but as a matter of co-operation with other parts of the Empire. This is just a small illustration of what this Conference may lead to in bigger things.

MR. E. H. FINLAYSON (Forestry Branch of the Department of the Interior—Ottawa) : The Dominion Forestry Branch has heretofore done something in seed collection for the United Kingdom. We have been asked for increasing quantities during the last six years, but we have been handicapped by lack of personnel. But now one of our men is engaged in the collection of as much Douglas fir seed as he can possibly get up to an amount, I think, of some 2,000 lbs.; also, he will collect Sitka seed. The main difficulty we have had in that direction lies in the lack of facilities for collection and for threshing and cleaning the seed. These have really been very great.

A short discussion which we held in our office at Ottawa before I left, may be summarised in the following words, that if it was not possible to do everything necessary in the line of seed collection through co-operation with the different forest organisations in Canada, the Dominion Forestry Branch would itself undertake to collect for the Imperial Forest Authorities, so far as lay in our power, the requisite amount of seed. (Mr. Finlayson handed in a statement showing that 1,284 lbs. of seed had been supplied to Forest organisations in the United Kingdom in the three years 1917-1919, including 450 lbs. of Douglas fir and 711 lbs. of Sitka spruce, at an average cost of \$3.82 per lb.).

MR. H. R. MACKAY (Forests Commission—Victoria): It is not a question with us in Australia of obtaining seed merely by the hundredweight: what we need for present and future supply is many tons, in the aggregate, and many hundredweights of the best species, particularly such species as Monterey Pine and the best forms of Laricio, Sitka spruce and Douglas fir, which succeed very well with us in moist soils.

The cost of Monterey pine with us, when it is bought in quantity, say, a ton or $1\frac{1}{2}$ tons at a time, is 4s. 6d. a lb., but when we buy in small quantities certain species which grow in Canada or the United States, they may cost up to 40s. to 45s. per lb., which is almost prohibitive.

Therefore, for local supplies of seed, such as *P. Laricio* and *P. radiata*, we are dependent to a certain extent on our own trees, which unfortunately can only be depended on for small quantities at present.

There are only two countries where proper seed-testing stations are established, Denmark and Saxony. I hope that one of the results of this Conference will be the early establishment of a proper tree seed-collecting and testing station in Great Britain, and seed-collecting stations also in the chief outlying provinces of the Empire. It will be of great practical benefit to all of us who are interested in forestry. Taking eucalyptus, for instance, obviously South Africa and other countries in the drier regions which specialise in eucalyptus planting must get their supplies from Australia for some time to come. As the Australian States do not undertake in any way the collection of eucalyptus seed, South Africa has in the past been under great disadvantages. It has not at all times obtained its supplies of seed true to name. The result is, it has planted large areas under the name of red mahogany or *Eucalyptus resinifera*, and subsequently it has been found, when the trees grew to a fair size, that they belonged to a totally different species, which would not have been planted had they known what was sent. Therefore, I think, even in Australia, the Federal Government must establish a central seed store, from which the outlying parts of the Empire which require to obtain tree seed will be able to obtain it true to name and type.

MR. R. L. ROBINSON (Forestry Commissioner—United Kingdom): I should like, if I may, to refer to one or two points in connection with seed supply. The position brought about by recent forestry activities is roughly this, that the quantity of seed required in the British Empire has probably increased 10 times.

If we take the United Kingdom, instead of the State sowing about 200 lbs., as it did before the War, last year our sowing programme was 10,000 lbs., and that represents a considerable amount of money, because a good proportion of the Douglas fir and Sitka spruce seed that we get now costs in the open market anything up to 25s. a lb. And there is this important point, that

a lot of that seed has been got from merchants whom we do not know, with whom we had not dealt before, and in the case of Douglas fir there is a doubt whether we are getting seed of the coastal variety—which is what we want—or the blue variety which you saw in Dean Forest. Consequently, although we sow, say, 1,000 lbs. of Douglas seed this year, it does not follow that we have not placed our whole programme three or four years hence in jeopardy, by getting the blue variety instead of the coastal variety.

I went to Corsica at Easter time to look into the position there, and I can say this: If Australia gets into competition with ourselves for Corsican pine seed, the Corsican brigand will have the time of his life.

The CHAIRMAN: Three points arise from this discussion on the seed question: (1) the increased demands of the Empire; (2) the importance of co-operation; and (3) the necessity for collection and distribution of information about seed possibilities in individual areas and in individual years.

We now pass on to the questions of treatment and protection.

TREATMENT AND PROTECTION.

Dr. J. W. MUNRO (Forestry Commission Entomologist): As the result of experiments carried out last year it is apparent that our main efforts in protection must be directed to the question of insect pests. They may be divided into two groups, pests which are well known and of which the capacity for injury is fully apparent, such as the Larch Sawfly, the Pine Weevil and the Pine-shoot Beetle, and pests which are little known and of which the capacity for injury is uncertain.

Remedial and control measures against the first group are in general use, while experiments in control are now being continued.

In the second group two insects deserve special mention, namely, the Douglas Fir Seed Fly (*Negastigmus spermotrophus*), and the Douglas Fir Aphis (*Chermes cooleyi*). The first of these is now firmly established in this country and its life history is being studied. The second is a comparatively recent introduction and is, so far as is known, limited in distribution to the Southern Counties of England and to one district in Peebleshire, Scotland. This aphis may prove a serious enemy of Douglas fir, one of our most important forest trees. Steps are now being taken to deal with it both in established plantations and in nurseries.

Professor A. HENRY: It is very interesting to look back 30 years and contrast the position in which exotic trees generally and Douglas fir and Sitka spruce in particular stand to-day as compared with then. There are two classes of people interested in trees, the dendrologists, who study trees intensively and the foresters who cultivate them extensively. The latter at that time practically did not believe in cultivating anything but what

they called indigenous species. The foresters even spoke of larch and spruce as indigenous species in England. With the help of the dendrologists, the Douglas fir and Sitka spruce which were then trees only planted for ornament, are now become very important in our forestry operations. The value of exotic trees is not only recognised here, but in many other countries, as for instance, *Pinus radiata* in South Africa, where it produces 500 cubic feet of timber per annum per acre. Exotic species are also used to a considerable extent in Australia.

So far we have spoken of getting seed of trees from our own Dominions and Colonies only. We think that the British Empire contains everything needful. This is not the case. There is one region outside the British Empire from which we may obtain new and interesting species, for example, Chile. I may adduce one of the Southern beeches, which grows in Chile, namely *Fagus obliqua*. There are five trees of this species at Kew, 17 years old from seed, grown in different parts of the gardens. These trees measure on an average 42 feet in height and 2 feet 1 inch in girth. The Forestry Authority should get into touch with Chile and obtain seed of this and other species, and establish plots of say 5 acres in the various Crown Forests, in order that we may know something about the future in the country of Chilean species producing useful timber, as Southern Chile has a climate much like our own.

The CHAIRMAN: We should like to hear some more on the subject of the treatment of plantations.

Professor R. S. TROUP (India): May I amplify the previous argument on natural and artificial reproduction in the tropics.

The whole question to my mind depends on weeding. Weeding is, perhaps, the most important tending operation with which the forester in the Tropics has to contend, and the choice between natural and artificial regeneration is governed to a very great extent by the excessive weed growth that one encounters in the Tropics, particularly in the moist parts. I know of cases where the natural reproduction of teak has had to be abandoned altogether because of the cost of bringing it up owing to the amount of weeding required, and artificial plants have been deliberately put in the same area in regular rows with the view of facilitating and cheapening weeding. This question of weeding is so important in tropical forestry that I think it almost amounts to the crux of the whole question.

Mr. BATTISCOMBE: It may interest the delegates to know that in British East Africa we have had very great difficulties to contend with in natural regeneration. We are now carrying out experiments in the way of introducing the more valuable indigenous trees into the eucalyptus plantations. There is a great demand for firewood in British East Africa. We have our eucalypts in rotation of 10 to 20 years. We use the native cultivator to help us clear the ground. We give him the land in the first year, he raises his crops; in the second year we plant our trees, in that and the third year he plants himself; about the fifth year the soil is absolutely clean, and there is a regular crop. It is

our idea to plant indigenous trees, and to increase the planting with fast-growing exotics. Our experiments have been entirely successful, and it is far and away the cheapest way of treating our woods.

Mr. WILSON : We are carrying out experiments in planting with spruce in order to get an early crop of box wood and poplar wood. The spruce does better where it has a certain amount of shade, but by planting poplar 12 by 12 and spruce 5 by 5, we hope to get two crops.

The CHAIRMAN : As the question of poplar has been raised, I may say that during the last years of the war, when I was in France, I paid very particular attention to the poplar plantations, and I am quite persuaded that in France they have brought the subject of poplar planting and yield from poplar to a fine art. On a 55 years' rotation, it is reckoned that in planting low-lying grazing land with one poplar to every 14 feet interval both ways, on the square, each poplar tree at the old price brought in two francs net per annum. I have checked that both in the North and South of France, and I understand that poplar plantations are being made on certain parts even in the Landes area, which is so suitable for pine trees.

Mr. ROBINSON : The question of thinning is intimately connected with the question of spacing and planting. I listened carefully to what Professor Stebbing had to say about the unequal development of Douglas fir, but my observation of Douglas fir plantations is that irregular development is characteristic of the species. That is to say, you always do get—whatever distance you space your plants—some growing a good deal faster than others, and on the whole I am inclined to think that that is an excellent thing where you want rapid production.

I would like to refer the delegates to a small experiment with Douglas fir which has been carried out on Lord Lovat's property at Beaufort. There was a 20-year-old plantation which had developed in precisely this irregular way, that is to say, some of the stems were three times as big as the others. We selected the big stems, spaced as regularly as possible all over the plot, and we said, "We will now try whether by suitable thinning we cannot induce these stems to grow even quicker, so that after 40 years they will be big saw timber, and so that the quality may be useful we will prune those Elite stems." I mention that experiment to show that this question of rapid production of reasonably good coniferous timber is capable of close investigation, and I think one might hope by such means to get big saw timber on quite short rotations of 35 to 40 years.

Mr. FINLAYSON : I would like to say a few words on the question of forest protection because it so happens that it has been the line of work in which I have been most actively engaged for the past eight years.

I may say that it gives me a considerable amount of pleasure to see that the question of forest protection, including, as it does,

the question of fire protection, finds a place in this Paper under the heading of Technical Forest Problems. In Canada, certainly, I am afraid that we have been neglecting some of the more technical problems, and a certain amount of criticism has been levelled at us, I think, from time to time for laying, perhaps not too much stress on fire protection, and so neglecting some of the other features of forestry proper.

In few places in Canada is it necessary to give attention to protection from grazing. Plantations are limited in extent, and the problem therefore small. In some of the plantations, however, the question of protection against rabbits and such animals must be given consideration. For the country generally, however, it may be stated that grazing is rather encouraged than discouraged; and particularly throughout Western Canada, where properly regulated grazing is an important factor in fire protection.

With regard to ground game; from time to time we have visitations of rabbits which do considerable destruction in our stands of natural regeneration. In one case it was suggested that it would be better, rather than to do something to reduce the number of rabbits, that the Forestry Branch should cut down poplar trees and spread the limbs on the ground so that rabbits might have plenty of food without destroying the trees.

Coming to the question of fire, I cannot attempt to cover the whole field for Canada; I may say, however, that we divide our fire protection organisation under three headings, those of prevention, detection and control. The main causes of fire in Canada are—I am not necessarily giving them in order of their relative responsibility—(a) railroads, (b) campers, hunters, trappers, (c) land clearing, (d) lightning, (e) other causes.

For railroads in Canada we have a very excellent piece of legislation under which it is possible for any forestry organisation interested in fire protection, having to do with lines under the control of the Railway Commission, to secure satisfactory results. The legislation of the Railway Commission provides for: fire protective appliances, clearing the right of way of unnecessary combustible matter, fire guards, and fire patrols; it also defines the responsibilities of railway officials in so far as fire protection is concerned. For these railroads therefore there is no reason whatever why a very satisfactory degree of fire protection cannot be secured. The co-operative arrangement, in effect, is that the Railway Commission have a Fire Inspection Department, in charge of which is Mr. Leavitt, who is a delegate to this Convention. Every forest organisation throughout the country has the privilege of organising a special railway fire protective service in co-operation with the Fire Inspection Department of the Railway Commission.

With regard to fire prevention measures in various parts of Canada we have various fire protective laws. We also make use of publicity, including the extensive use of posters and advertising material, the giving of lectures and the preparation of newspaper

articles. Very good work has been done by the Canadian Forestry Association so far as fire propaganda is concerned. For fire detection we depend largely on patrols which may be fixed on the lookout system, or on moving patrols in the form of railway speeders, automobiles, motor cycles, even steam boats are used in the Mackenzie River, motor boats, canoes and boats, horses (saddle and pack), horses and rigs, dogs even are used for packing in Northern Alberta. Finally, there is the work of the aeroplane fire patrol. After experiments in British Columbia and in Quebec last year an expansion has taken place in the Province of Quebec this year, more machines are being used and it is hoped they will go a long way towards solving the forest protection problem, as well as that of forest reconnaissance. We have arrangements for the adoption of an aeroplane patrol service over an area of from 4 to 5 million acres in the Province of Alberta. The Air Board of Canada has undertaken the work, and the expenditure on that form of fire protection in the Province of Alberta will amount to 120,000 or 130,000 dollars, which sum has been specially provided for this work. In British Columbia also the Air Board is undertaking considerable patrol work.

In conclusion we may say that in Canada we have just got through the outer shell and have perhaps scraped the kernel of many of the fire protection problems.

(After an adjournment.)

EDUCATION AND RESEARCH.

Sir CLAUDE HILL presented the following paper :—

FORESTRY EDUCATION AND RESEARCH WITH REFERENCE TO INDIA.

It is thought that the most helpful method of dealing with this subject, for the purposes of the Conference, will be to subdivide it into the following main headings :—

- I.—Forestry Education and Research, as organised *for India* at present.
- II.—The future, as at present projected, of Forestry Education and Research *for India*.
- III.—Certain wider aspects of the question.
- IV.—Suggestions for consideration by the Forestry Conference.

I.—FORESTRY EDUCATION AND RESEARCH AS ORGANISED FOR INDIA AT PRESENT.

Education in India is carried out on different lines for (1) the Imperial, (2) the Provincial, and (3) the Subordinate Services.

(1) *Imperial Service*.—In the earlier days officers were trained partly in Germany and partly in France. From 1875 to 1885 the training was carried out wholly at the School of Forestry at Nancy in France. A Forestry branch was established at Cooper's

Hill in 1885, and from that year onwards recruits were trained at that college. With the abolition of Cooper's Hill the training was transferred in 1905 to Oxford University, which was for some years the sole training centre. In deference to representations from other universities it was arranged about 1911 that Cambridge and Edinburgh should also be recognised as additional training centres. This plan is still in operation, though during the war there was an almost complete cessation of recruitment and training for India.

(2) *Provincial Service*.—Trained at the Forest Research Institute, Dehra Dun.

(3) *Subordinate Service*.—Trained at various centres in India and Burma.

Research on systematic lines was started in India in 1906 with the establishment of the Forest Research Institution at Dehra Dun. The various heads of research are (1) silviculture (including statistical work), (2) forest utilisation (various branches), (3) forest botany, (4) forest zoology, and (5) chemistry. Research officers deliver courses of lectures to the provisional service classes.

II.—THE FUTURE, AS AT PRESENT PROJECTED, OF FORESTRY EDUCATION AND RESEARCH FOR INDIA.

2. There is not, and never has been, any question of training the candidates for the provincial and subordinate services anywhere but in India, and it is, of course, recognised by the authorities in India that, whether the training of candidates for the Imperial grade of the forest service takes place in India or Europe, it will be necessary to maintain and largely to develop and expand, the Research Institute at Dehra Dun, for the stimulation and prosecution of research work of all kinds in regard to problems whether of provincial or general concern. On the other hand the Government of India have recently been facing the very large and important problem of the training of future candidates for the Imperial Forest Service; and it will be readily understood that upon the wise determination of this problem may depend to a very great extent, the success which will attend future efforts at expansion in forestry.

3. The Conference will appreciate the difficulty of the problem when it is explained that, whereas in the past the service has been recruited exclusively from among Europeans (owing, partly, to the apparent unattractiveness of the forest service to educated Indians), in the future the Government of India have determined to recruit for the higher forest service, as for all other services, a definite proportion of Indian candidates. This decision has a very important bearing upon future methods of training; for the Government of India have based largely upon it their determination (in which the Secretary of State for India concurs) that ap

essential feature of any scheme of recruitment and training in the future must be the *joint training at one centre and in one special institution* of both Indian and British recruits to the service.

4. Discussion of methods has throughout been conditioned by this decision ; which implies the recruitment of Indian candidates in India and of European candidates in England, under as far as possible identical conditions, the selected candidates to be then concentrated for training either (*a*) in England or (*b*) at Dehra Dun in India. If, and for so long as, the problem can be regarded as solely one for the Government of India, then, clearly, unless England offers opportunity for a system fulfilling the condition of joint training at one institution (which is regarded as vital to compliance with India's needs), India is thrown back upon Dehra Dun ; and this, precisely, is what has happened. Under existing conditions the three universities of Oxford, Cambridge and Edinburgh have all endeavoured to create schools of forestry capable of imparting tuition of the standard required for the training of recruits for the Indian Forest Service ; and it would be impossible to expect that any two of those universities would consent to close their doors to Indian forest students in favour of the third. Nor, indeed, even though that consummation were reached, would such a solution of itself entirely fulfil India's stipulated requirements. The dispersal of Indian and British forest students throughout the colleges of Oxford, for example, would fail of complete compliance with India's needs, which, it may be frankly stated, emerge from the determination of India that Indians, in certain proportion, are to be annually recruited for the Imperial Forest Service. That service has a great record behind it, and Indian forestry and the department have a wonderful future ; and it is unquestionably right that every possible safeguard should be adopted to secure the continuance of that high standard of devotion to duty and that *esprit de corps* and fellowship between Imperial forest officers which are so especially necessary in the case of the department of forestry, and which have been so conspicuous a feature in the past. An attempt will be made, in the following sections of this paper, to examine whether there are factors of wider import which would justify either urging the Government of India to change their decision, or to suggest means whereby training in Europe might be arranged for in conformity with the stipulation which the Government of India would clearly make.

III.—CERTAIN WIDER ASPECTS OF THE QUESTION.

5. The starting-point for discussing forestry development from the "Imperial," as opposed to the "Dominion" or "Dependency," point of view may be taken to be the forestry legislation for Great Britain, which was one of the good results of the war. Great Britain has recognised her obligation to see that the natural resources in forestry within her boundaries shall be administered for the national good : and money has been appropriated for the purpose of providing a technical training for the

different grades of forest officers who will be needed, not only to staff the official ranks, but for employment by private owners of forest areas. It is believed, moreover, that Canada, Australia and South Africa (among the dominions) have entered upon a consideration of the problem of the conservation and development of their valuable forests, and that it is now universally realised that only by the promotion of higher research and the provision of the best possible technical training is it possible to derive the fullest value from those natural resources. India may have, at the moment, the largest and most highly-organised forest service within the Empire; but we in India recognise that, especially in regard to exploitation problems, we have a very great deal to learn from other parts of the Empire, as, for example, Canada. Hitherto there has not been that full interchange of information and views on forestry which would be so valuable.

6. The action of Great Britain, therefore, seems to us from India to constitute a favourable occasion for considering whether it is best that each part of the Empire should go forward on its own account, evolving its own research, organisation and policy, and buying its own experience unaided, or whether it is not possible to create a machinery by which the whole Empire will be in a position to ensure that the larger problems relating to the administration of forestry shall be submitted to and advised upon by an authority recruited from all parts of the Empire, and which should organise the training of the forest experts and specialists of the whole Empire. Will efficiency, economy and enterprise be stimulated by such a scheme or will it be preferable to leave each part of the Empire to evolve its own machinery for research and higher education? There is much to be said on both sides, but we, members of the Indian Delegation, cannot but feel that, even though local research and local training for the lower grades of forest work are provided for, it may be questioned whether local education and research, however highly-developed, can cover all the ground, and whether there would not be great advantages in arranging that the higher branches of the various forest services should not receive their training, whether in fundamental principles or in post-graduate studies, at a central institute for the whole Empire, where access would be had to the results of the highest research in problems affecting forestry throughout the world, and where the greatest living experts would be congregated.

7. In making any attempt to marshal the arguments in favour of such a scheme, some assumptions are necessary, and, for the purpose of presenting the reasons which lead us definitely and strongly to urge the Imperial view, we have assumed that the Imperial Forest Bureau, if it is to come into being at all, will be established in Great Britain. The following are some of the advantages which we think weigh in favour of such a proposal:—

(1) Britain is the centre of the Empire.

(2) The proximity of Britain to the Continent of Europe, where scientific forestry has been brought to a high

state of perfection, renders it geographically the most suitable part of the Empire in which to locate a thoroughly well-equipped training institution.

- (3) In no part of the Empire will it be possible to obtain so great a choice of scientific teachers or to equip a first-class school of forestry so efficiently as in the United Kingdom.
- (4) An *esprit de corps* among forest officers throughout the Empire, leading to mutual assistance and the interchange of ideas, will be fostered if they receive their training under similar conditions and particularly when these conditions involve a close study of scientific forestry as exemplified in Europe.
- (5) Although the conditions in different colonies may vary greatly the general principles of the science of forestry are more or less constant; and these can be studied better in Europe than elsewhere, and their subsequent practical application will rest on a sound foundation. Similarly, in regard to research work, a good training in forestry should aim at teaching correct *methods* of research, which can subsequently be applied under widely varying conditions.

8. We, the members of the Indian Delegation, are unanimously of opinion that the balance of advantage, from the point of view of India at all events, lies heavily on the side of the establishment of an Imperial Forestry Institute in England.

IV.—SUGGESTION FOR CONSIDERATION BY THE FORESTRY CONFERENCE.

9. Reference may first be made here to one factor in the problem which has not yet been mentioned, but which has an important bearing equally upon the Dominion and Indian aspect of the case. It is only in Europe that complete object lessons are available such as can serve as the ideals at which forest policy can aim. In no other part of the world is it possible to illustrate the theoretical works with object lessons exemplifying various systems of silviculture. It takes at least one, and generally two, complete rotations to establish a full series of age gradations; and, as a rotation takes approximately a century, a long series of years is required to produce suitable object lessons. Conditions in India are such that it will certainly be a century before any of the Indian forests reach a stage in any way comparable with the highly developed and intensively worked woods of Europe. It is believed that the same is true of the Dominion forests.

10. It is assumed that, just as in the case of the Imperial Forest service of India, so in other parts of the Empire, the highest grade of the forest departments will be composed of a relatively small body of experts who will administer and control the forest estate. Unless this *corps d'élite* of the forest service is

equipped as highly as possible, and has had the opportunity to formulate and understand the ideal which should be aimed at, the time which it will take to bring either the virgin or (as is the case in parts of India) the maltreated and semi-ruined forest to the point of highest economic efficiency will be indefinitely prolonged. It is, of course, impossible to estimate in term of money the loss to the State which may accrue through mistaken experiments based upon incomplete knowledge, but that the potential loss is immense will be conceded by anyone with any acquaintance with the history of forestry.

11. Again, forestry embraces such a wide range of subjects that it is only by specialisation that experts can be secured for the different branches. The principal obstacle to specialisation is the complete absence within the Empire, at present, of any centre at which the necessary equipment can be found and (of even greater moment) the essential staff and advice can be trained or obtained. This is a fundamental defect which can, it is suggested, only be made good satisfactorily and economically in Great Britain.

12. Some of the foregoing considerations have led the representatives from India to hope that this Conference would permit the submission to it of suggestions which may lead to measures designed, in the common interests of all component parts of the Empire, to establish forest research and training upon a more comprehensive and satisfactory basis than is possible if each section deals piecemeal and unaided with its own difficulties. An endeavour will now be made to summarise what Indian experience suggests as the needs of the situation, and it is hoped that, as a result of the deliberations of the Conference, it may be possible to devise recommendations to meet those needs which will commend themselves to the Governments of the Empire.

- (a) The war has brought prominently to notice the duty of every State to see that the national asset of its forest lands is properly administered.
- (b) For the proper administration of that asset it is essential to establish more and more fully equipped institutes for research than at present exist, and it may be economical, and tend to greater efficiency, if a Central clearing house of information as well as an institute for research in the problems of universal application is established at a centre convenient to the Empire.
- (c) For the training of the upper controlling and administrative staff for forestry not only are the best available experts needed as teachers, but these must have access readily to the results of the research referred to under (b). Moreover, the students for that work must have access, while undergoing their theoretical training, to forests illustrative of the best methods of management.
- (d) While it is essential that provincial and local research should continue to be promoted and encouraged, and

while local education should continue to afford training in forestry for the executive and subordinate staff, it is suggested that there would be very great advantage to every component part of the Empire if, in all the circumstances, the training of the highest controlling staff took place in Europe in the same locality as the central research institute referred to in (b).

- (e) For India, in the circumstances explained in section I and II of this paper, there are reasons why this central institute for training and research, if it is to serve Indian requirements on the educational side, should be a self-contained institute.
- (f) The ideal, again from India's point of view would, in the opinion of the members of the Indian delegation, be that the Research and Training Institute, though a separate institution, should be established at one or other of the Universities, in order that the students should be enabled to take part in the inter-collegiate life of a University, but it should, on the educational side, be as far as possible self-contained. though, on the research side, its work and laboratories might be part of the University's general laboratories and resources.

13. It is recognised that the scheme outlined in the foregoing paragraphs has been framed primarily to meet conditions which may not entirely find place in other parts of the Empire. It is further realised that it will be costly, and that the financial aspect of the case will need the most careful investigation.

The Government of India, have, within the past few years, realised the urgent need for the expansion of their forest staff, and for the strengthening of both the research and educational sides of their Forest Research Institute at Dehra Dun; and they are satisfied that it is the truest economy to spend money more liberally in order to secure a better return from their wonderful forest property. They have in hand a scheme of very large development, which, as will have been understood from section II of this note, is designed to include the establishment of an institute at Dehra Dun for the highest training of their controlling forest staff. It is possible that the other component parts of the Empire may prefer to follow a similar course. On the other hand, if the advantages of efficiency, co-operation and co-ordinated development which it has been suggested would be secured by the above scheme are held to be based upon sound reasoning, this Conference may be disposed to recommend that the proposition be the subject of special investigation, with special reference to research, education and finance; and there is no reason to doubt that if the specific recommendations can be made to conform to the essential requirements of the different parts of the Empire, they, as well as India, would give the most earnest and prompt consideration to the proposals.

14. Attached to this paper is a copy of the proceedings of a Conference held in Simla, in April of this year, on the same subject. The conclusions then arrived at have not, as yet, received the formal imprimatur of the Government of India, who will doubtless attach great weight to the opinion that may be recorded by the Conference to-day.

NOTE OF A CONFERENCE HELD ON THE 3RD APRIL, 1920, REGARDING
THE TRAINING OF RECRUITS FOR THE INDIAN FOREST SERVICE.

In the Despatch, dated 12th February, 1920, the Secretary of State apparently decided finally that training, both of European and Indian recruits, for the Imperial Forest Service should, when adequate arrangements can be completed, take place at Dehra Dun. Since, however, in his telegram, dated fifteen days later, an indication is given that the question is not finally decided, it is important to arrive at a definite conclusion as to what is, in all the circumstances best for the interests of Indian Forestry of the future. The subject was debated at a meeting held on the 3rd April in Sir Claude Hill's office, at which the following were present :—

The Hon. Sir Claude Hill, K.C.S.I., C.I.E.

Mr. J. Hullah, Secretary, Revenue and Agriculture Department.

Sir George Hart, K.B.E., C.I.E., Inspector General of Forests.

Mr. W. F. Perrée, C.I.E., President, Forest Research Institute.

Mr. J. W. A. Grieve.

Mr. A. J. Gibson.

Mr. R. D. Richmond, Assistant Inspector General of Forests.

2. The starting point in considering this question is the general agreement that has been arrived at between the Secretary of State and the Government of India in the view that, having regard to the Indianisation of the Service, it is essential that there shall be joint training at one centre and preferably in one institution; and it thus appears that any plans for the future must be conditioned by this requirement.

3. On the assumption, then, that training must be at one centre and preferably at one institution, the Secretary of State, having in view the grave difficulties of securing this in any other way, has provisionally approved of the proposal that it should be imparted, as soon as adequate arrangements can be made, at Dehra Dun. While it is recognised that, if other alternatives do not exist, this is inevitable, there are such weighty consideration in favour of carrying out training in England that it is felt that, before the Government of India are finally committed to Dehra Dun, every possible alternative should be fully explored; and since the opportunity for such exploration will offer in connection with the Forestry Conference to be held in London in July, we recommend that the representatives of the Government of India at that

Conference should be charged with representing as forcefully as possible the considerations which weigh in the balance on the side of England.

4. The considerations on either side are the following :—

(a) *In favour of training at Dehra Dun.*

- (i) From the point of view of the Indian politician it will be matter for pride to think that there is in India a Central Forest Institute of world-wide importance.
- (ii) A certain class of Indian will prefer that his son should be trained in India rather than have to proceed to England.
- (iii) The establishment of the Training Institution at Dehra Dun would *ipso facto* raise the strength and importance of the research side of the work done there and attract students from other parts of the Empire.
- (iv) From the point of view of the Government of India there would be great advantage in having the immediate—almost unfettered—control over its own training establishment.

(b) *In favour of training in the United Kingdom.*

- (i) First, and most important of all, the Indian trained in Europe will unquestionably acquire a status which will not be secured if he is trained in India.
- (ii) The selected Englishman will do better if trained in England, and possibly the Service will attract more widely than if the training period is spent in India.
- (iii) The influences of the surroundings of the institute are of importance, and here there are grave drawbacks inherent in Dehra Dun and corresponding advantages in a place like Oxford. If the training took place not only at Oxford, but in an institute specially created for the purpose, such an establishment would possess all the attributes of an affiliated college and would develop both for Indians and Englishmen alike precisely that kind of joint *esprit de corps* which is desired.
- (iv) If the Imperial Forest Service is to be trained at Dehra Dun it will be necessary to revise entirely the scheme for recruitment and training of provincial officers and this may involve heavy expenditure.

(In summarising the *pros* and *cons* the assumption throughout is that the teaching at Dehra Dun will be the best possible. This can be arranged for, and no consideration of cost should be allowed to prejudice this essential requirement.)

5. We are of the opinion that the reasoning in favour of training in the United Kingdom possesses greater force than that in favour of Dehra Dun. In particular, we feel that the argument in (b) (i) of paragraph 4 is conclusive on this point. It is thought that,

if the Forest Service of the future is to command adequate status and influence and to attract the very high personnel which has characterised it in the past, then it is most desirable that the training should be in England, for there can be no question that Indian opinion will have a greater regard for a Service whose training has been in part in Europe than for one which is exclusively trained in India.

6. Without actual data before us we are unable to compare the relative cost involved in establishing an Institute in England and at Dehra Dun, respectively; but it is possible that the cost of the former would not very greatly exceed that of the latter. An important feature in either eventuality would, it is thought, be the throwing open of the training institute to students from other parts of the Empire and the world, but here there can be no question but that the attractiveness of the institute would be greater if it were established in England. The inherent importance and influence of such an establishment at the centre of the Empire cannot well be overstated. With the development of an interest in forestry in the United Kingdom and the indications which exist of a similar movement in Australia, Canada and Africa, there would seem to be reason to hope that a Central Institute for the Empire is a desideratum to which all its larger component parts would subscribe. This might be—though to a lesser extent—the case if Dehra Dun were suitably developed, but it is thought that, if such an institute could be inaugurated in England, it would develop far more rapidly and satisfactorily than could be the case in India, even making allowances for the vast forest resources accessible in India.

7. In case, therefore, it is justifiable to hope that the question of the location of the institute for training recruits for the Indian Forest Service is still an open one, it seems to be well worth consideration whether there is not scope for creating an institute which will cater for the needs of the whole of the Empire. There is ample time to consider this. The area which is being taken up in Dehra Dun for the enlarged requirements of the Forest Research Institute comprises a site in every way suitable for the hostels or boarding houses of the Imperial students. But the building of the new research buildings with all the accessories and the residences for members of the staff must occupy a period of at least four years before completion and there is, therefore, a year within which this question can be considered without detriment to the completion of the necessary buildings at Dehra should the decision be that training should be conducted there.

8. The ideal which might be aimed at would be the inception of a scheme for establishing an Imperial forest institute in the United Kingdom to be located preferably at Oxford, but not necessarily connected with any University. Such an institution should cater not only for the Indian Service requirements but also for the training of students from Australia, Africa, Canada and the United Kingdom, both State and private. The

institution if located at a University centre would be regarded as a college in affiliation to that University and would thus, while providing training at one centre and social life at one institution, also have the advantage incidentally of being an integral part of the University.

9. It would be premature at this stage to suggest how the syllabus could be adapted to such a modification of the scheme of training, but it is important at once to point out that such a scheme might modify materially the views as expressed in the Secretary of State's despatch regarding the age at which students should be selected. In any case it seems desirable to indicate that if the qualification of a science degree is insisted upon the age limit, as given in that despatch, appears to be unsuitable.

Sir CLAUDE HILL (Member of Viceroy's Executive Council, India) : I propose, as the paper is rather a long one, not to read the whole of it, more especially for reasons which will be apparent later, but to give you as briefly as I can a summary of it, and then to proceed to certain modifications which are the result of the association which we have enjoyed with delegates from other parts of the Empire.

As regards the paper itself—I believe a copy is before every delegate—Sections 1 and 2, dealing with forestry and research as organised for India, are dealt with purely from the Indian standpoint, but I think it would be convenient, perhaps, in view of what follows in Sections 3 and 4, that I should explain as briefly as possible what the view of the Government of India is, how it has been evolved to its present stage, and the reason why the views as regards the future of education for the Forest Service of India may be subject very vitally to modification in the light of proposals which may emanate as the result of the Forest Conference.

During the past four years, the Government of India have realised more and more acutely the need of expanding their Forest Service, not only for the sake of placing it on a footing reasonably strong with reference to research and general conservation, but with reference to the economic side. The profits to the State from Indian Forestry have increased very considerably of late years, and that is an increasing asset which has naturally influenced the Government of India as a whole to view favourably projects for expansion of the staff necessary for administering the forests. This question was evolved more or less simultaneously with a scheme of reform which vitally affects the proposals as they were ultimately made by the Government of India for the future recruitment of the Forest Service. As has been made apparent, I think the scheme of reform connotes transference of forest administration to the Provinces from the Government of India, who will, however, retain general control over the recruitment system of the Imperial Forest Service and also the direction of research generally from the point of view of India as a whole, though we hope the Local Governments will

develop their own research hereafter. Also simultaneously with that, and obviously, I think correctly, with a view, if even only from the point of view of interesting India and Indians in the preservation of their forests and their development, it was essential that they should be recruited, we hope, in increasing numbers to the Service, otherwise it would be rather hopeless to expect India to take that active educated interest in forestry which will be essential for its ultimate development. It was, therefore, decided that an admixture of Indian gentlemen, selected from the point of view of suitability for forest work, should be made to the Imperial Forest Service, which hitherto, owing partly to the indifference of Indians to forest work, had been exclusively recruited from England.

Well, then came the question of how best to arrange for the training of this newly constituted and enlarged Service, and one of the factors which we are all agreed upon was that if that *camaraderie* and *esprit de corps* which has been such a wonderful characteristic of the Indian Forest Service of the past was to be maintained, and if Indians recruited for the first time to the Forest Service were to be associated with a fair chance of success in the Service, it was essential that the training of those selected probationers for the Forest Service should be carried out in such circumstances as would give hope that Indians and Englishmen members of the Service would continue that kind of *camaraderie* and *esprit de corps*. Therefore, in submitting proposals to the Secretary of State, the Government of India stipulated that arrangements must be made in the future for the joint training at one centre of their future Imperial Service. Well, that stipulation was very difficult to meet, and the only alternative to an arrangement by which England could meet it was to enlarge Dehra Dun, the present Research Institute in India, to such a degree as would enable the training of the selected probationers, both in India and in England, to take place there. In point of fact the Secretary of State intimated that, as it was hopeless to expect the Universities in England to fall into any arrangement under which training could take place at one of them to the exclusion of the others, the position must be in favour of Dehra Dun.

Now there are certain very material and very great objections to Dehra Dun. I do not propose to go into them; some of them have been referred to in the paper, but we, the members of the Indian Delegation, feel unanimously that if it is possible to secure an arrangement, satisfactory as regards the stipulation of the Government of India under which the training in future of the Imperial Forest Service of India shall take place at a great centre of the Empire, with all the advantages which are thereby connoted, it will be far preferable to any other arrangement, including that alternative of Dehra Dun. I may mention as an item of interest bearing on the point that Indian gentlemen whom I have consulted also feel that the Imperial Forest Service ought

not to be the only Service in India in which training is exclusively imparted in India and not in England, and from that point of view I am myself fully convinced that Indian opinion will, on the whole, incline to favour the continuance of the present system under which the training of forest candidates takes place in the Mother Country.

The next principle which actuated the Government of India in their proposals, though it is not explicitly gone into in the correspondence, was one which I am glad to find corroborated on all hands from conversations I have had with delegates to this Conference, namely, that education and research must proceed hand in hand at the same centre or centres; in other words, that research is necessary for education, and education also materially assists research. That seems to me a very fundamental and very important principle on which, as I say, I gather from conversations I have had, all delegates to this Conference will be in complete agreement.

But I do not wish to minimise for a moment the peculiar position, the altogether separate position, if I may so express it, which India occupies in relation to this problem of education, and regarding which I am in hopes that the deliberations of this Conference will lead to a solution which will be acceptable to all parties and enable us to hope that the training of candidates for the future Forest Service of India will be conducted in England and in conjunction with that Imperial Forest Centre which has been alluded to so often as a desideratum, and which, as I say, I feel confident we all wish to see established at the centre of the Empire.

To summarise, the objections to a self-contained scheme of training and research in India appear to us to be threefold. Firstly—and this is a very important point which applies, I think, generally—the absence in India of complete object lessons, to serve as the ideals towards which systems of silviculture should aim. I have tried to deal with that matter in paragraphs 9, 10, and 11 of the paper which is before you, and I will not endeavour to elaborate the point here, but I believe it is generally accepted that it is only in Europe that there are exemplars of the kind we need for the full training in the higher forestry for students, especially students, perhaps, who are specialising.

The second objection I have already referred to, namely, the lowering of status which the Forest Service would suffer in India in the eyes, particularly of Indians, if the training were to take place entirely in India; and the third factor is the grave loss to forest research work conducted in India, arising from its aloofness from other great centres of research. That is on the assumption that Dehra Dun Research Institute was established, as it were, solely for the sake of India and Indian Forestry, quite aloof from any co-operating centre at the heart of the Empire.

The paper in paragraph 12 suggested certain summary points which at that time we, the Indian Delegation, thought might be considered by this Conference, but I should like to say here that had we had the opportunities which we have had since of discussing this question of education and research with delegates from other parts of the Empire, I feel that this paper would have taken a rather different shape and that the points which we suggested in paragraph 12 for discussion by this Conference are not, in the light of the information we have since obtained, entirely suitable, and I have endeavoured, therefore, to modify somewhat the points to which I should venture to ask the Conference to direct their consideration. I therefore suggest for consideration that—

- (1) In whatever portion of the Empire education and research in forestry are to be provided, they should be instituted at the same centres.
- (2) For the Empire at large that central research in regard to fundamental problems of universal application should be instituted.
- (3) Such central research for the Empire should be established in Great Britain, since in Europe alone do there exist exemplars of the ideals towards which silviculture should aim (paras. 9 and 10).
- (4) In conjunction with such central research, provision should be made for such postgraduate study and training, and for such specialised tuition, as may be demanded by the needs of the Empire.
- (5) To meet the requirements in the matter of trained officers of those partners in the Empire who have no University training in the higher branches of forestry, the same central institute, if established, would be a suitable centre for the training of the superior forest staff.

I am aware that these five points for consideration are debatable and somewhat complex, but I have endeavoured to avoid one matter which would necessarily give rise to very considerable discussion, and that is the location of the proposed central institute. I do not think, if I may say so with respect, that this Conference can very usefully enter upon that very thorny subject. It seems to me that if we can debate such of those points as you, Sir, and the Conference think suitable for debate to-day, we shall have gone a very long way towards determining whether it is or is not desirable to establish in the heart of the Empire, in Great Britain somewhere, a research and educational institution such as I have endeavoured to outline, and that the subsequent steps will necessarily be the reference of any resolutions which this Conference may arrive at to the authorities throughout the Empire who are responsible for determining their applicability, and that, simultaneously, perhaps, a separate investigation by Special Committee or otherwise might usefully enter upon an examination of how best the principles which we

had determined upon could be carried into effect. But I venture, if that is thought suitable, to propose that this afternoon we might discuss the appropriateness of these five points in which I have endeavoured to summarise the view of myself and my Indian colleagues.

THE CHAIRMAN: In preparing for this Conference, I think you will agree that we have acted wisely in asking the Indian Delegation to present a paper on the question of education in the Empire. India holds a particular position in this connection, because she has the oldest forestry Service and has devoted a considerable amount of thought as to how and where her forestry educational work should be undertaken.

I suggest, firstly, that the discussion of where the centre of education should be in Great Britain will serve no useful purpose to-day, and therefore I trust that the Conference will give me the authority to rule out any discussion based on the claims of individual Universities. We have taken the view of discussing what was useful to the Empire rather than to any particular section of it, and I propose, with your support, to try and keep the discussion of education on these lines as we have on other subjects.

Secondly, I wish to make it clear that while Great Britain on account of her proximity to the European Universities and Centres of Research, her old established woods, and her easy access to Continental forests must for a time, at all events, have a position of special prominence on education and research, we believe and hope that the further progress of the Universities in the self-governing Dominions will be of real value to forestry education and research in the British Isles. We believe that already we might learn a great deal so far as forest engineering is concerned from the Universities of Canada. We have equal confidence that when Australia has decided on a central training place for Australia, we shall have much to learn from their research and educational work, especially in subjects such as eucalyptus cultivation.

I suggest that we debate the first point which is on the paper and then the question of education, and then research.

The first suggestion made by Sir Claude Hill is that, in whatever part of the Empire education and research in forestry are to be provided, they should be instituted at the same centres.

ASSOCIATION OF EDUCATION AND RESEARCH.

MR. C. E. LANE POOLE (Conservator of Forests, West Australia): This question of placing education and research at a common centre is one which has been taken up in Australia of late years. We are in a very serious predicament in Australia, for at present we only have eight trained men holding the diploma or degree of a recognised Forestry School, and our need for trained men is, therefore, very great indeed. The foresters of Australia have all agreed that it is necessary to provide those

trained men from the very fine material that we find in Australia, and not import them. They have also agreed that we want one school of forestry for the whole of Australia, that that school of forestry should be situated in the State which has the widest range of climatic conditions, that is, New South Wales. The qualifications for entrance into that school should be at least two years of science training at one of the Universities of the States; and, if possible, of course the possession of a science degree, but two years at least.

It has also been agreed between all our foresters that at the same forestry school there should be an organisation of research in forestry proper, that is to say, research into silviculture and forest management, forest entomology, botany, and so forth as distinct from research into forest products. We make it quite clear also that while the forest school must be situated in the State which has the largest range of climatic conditions, it should be situated in a forest as distinct from a University. All our foresters are agreed on that point, for we consider that by placing a school in the forest itself away from the atmosphere of the University we are going to get foresters with a broader outlook, who will think in square miles instead of thinking in acres. We have to put men out to look after, say, 500 square miles of country, and the forester who thinks in acres is going to be of precious little use to us.

No doubt, however, a Research Institute into forest products should be situated in some centre of industry. America has, of course, adopted that principle in the Madison Forest Products Laboratory, which is quite distinct from her forest schools. I feel, therefore, that education and research should be at the same centre so long as it is research into forestry, pure and simple, but when it comes to forest production, then I think we have every reason to place the forest production laboratory in another centre not in the forest.

The CHAIRMAN: I would like to ask a question. Do you propose that all your students should be postgraduate students with a University training?

Mr. LANE POOLE: No, Sir; we have not gone so far as that. It is proposed that they should have at least a two years' course at the University in the sciences. We hope to get a higher qualification than that, but a two years' course at the University in the sciences is what we now ask for.

Mr. ACLAND: It is natural for us, having in view the all-embracing character of what forestry really means, to think that we would like to have our research with regard to the uses of timber and timber products in the same place as our research with regard to timber production problems.

But there is the point that laboratory research and other research with regard to timber production ought to be done, if it is to be of any real good, in close connection with woods and forests themselves and with the men who are actually tackling

them in their everyday life. In going round with the Forestry Commission some of the Universities in England and Scotland, I found that every teacher claimed that he should have research connected with his work and that the Forestry Commission should pay for it, which meant often that his most promising student was simply stuck down in the laboratory with a certain number of test tubes and things, to do something at £300 a year, without any scheme for co-ordination or without any real scheme for his being in touch with the actual problems of forests.

Science quite naturally and rightly claims that it should be unfettered, and that you cannot produce results from research unless you leave science free to roam. Well, that is right, to a certain extent; but the only way in which you can check the exuberance of that spirit is that the researchers should be in close touch with the practical problems of the time, which means that they must be in close touch with the actual growing tree in the forest.

On the other hand, it surely is necessary that the business man, the timber user, the timber importer, the timber trader should be able to bring his problems before the people who are conducting research, and that he should be able to see that his research is going to be of some value to him. We in England certainly—I think it is, perhaps, a common characteristic of Anglo-Saxons generally—have failed a great deal in not seeing how extremely valuable research can be to trades and industries. You can only cure that by enabling these business people to see with their own eyes that it is possible to tackle their problems in a scientific way, and to produce results which will be useful to them. That seems to indicate that a great centre of research into timber problems should be in some such commercial centre as London, and not out in the woods, or in close contact with the woods, which London unfortunately cannot be.

Therefore, I think we should go astray if we were to decide light-heartedly to have scientific research on timber production and research on forest products in the same institution, without very carefully considering the admirable facilities offered by an institution such as the Imperial College of Science and Technology. There is an extremely live professor, Professor Farmer, in charge of the General Department of Botany there, who has been doing wonderful work in regard to subjects such as the technology of rubber, and they have recently acquired land for further expansion. I think, therefore, that we ought to consider very carefully the sort of facilities the Imperial College might offer for the study of these technological problems.

All our instincts must be to have the whole thing together, but I am not certain that when we come down to the practical facts we shall not find that there are a great many arguments, at any rate, in favour of having the technological researches as to timber and various products separate from the scientific research as to

forest production. I only want to throw that out as a caution to prevent us hastily rushing at the natural conclusion that we would like to have it all connected together.

Professor GROOM (Imperial College of Science and Technology): From the point of view of a teacher, I divide research in relation to forestry into three branches: first, the growth of trees; secondly, forest engineering; and, thirdly, forest utilisation. The first two of these are linked with the country, the third is linked with the town and with industry.

I will discuss now merely the further utilisation of British Empire timbers. The first barrier to that is ignorance of the qualities, the uses, the identities, and the sorts of timbers that are more or less unfamiliar to the user, whether the user be indirect as an architect or an engineer, or whether he be a manufacturer. I do not think that anybody unfamiliar with the timber trade understands the enormous conservatism of the timber merchant, but he has some reason for it. No architect, no engineer or manufacturer, in this country, with very few exceptions, will do otherwise than play for safety—that is, he uses the timber he knows to be good, and he is not going to take risks. Therefore, the timber merchant will not buy those timbers; therefore, the importer and the broker will not exploit those timbers; so that the first reason for the need of research is to obtain the knowledge of the timber from the moment it leaves the forest until it is absolutely the finished article.

The second point is that research is needed because some woods are too costly, or become too rare, and we want cheaper or more abundant substitutes. I will mention specific examples. For the moment, for instance, I am hunting for a substitute for teak, which we know is under a semi-monopoly and has reached an almost prohibitive price, for railway carriages.

The third reason for research is that foresters in various parts of the world have in their forests timbers that are useless, or even obstructions, and we want to find uses for them. It is rather interesting in this connection to notice that, during the late war, even in one narrow field—namely, timber for aircraft—how many timbers out of the number tested were found to possess rather remarkably the very valuable qualities required.

In India we found *Dalbergia Latifolia* remarkable for its mechanical values, and rather unique in one of those characteristics. In Ceylon we found the *Lunumidella* (*Mecia dubia*), having an extraordinary combination of strength and lightness; and in Papua we found another unknown timber that might be a substitute for coniferous woods.

We also want research from the chemical side. We know that coal supplies, and even oil supplies, are becoming depleted, and if we look for sources of energy available and constantly supplied, there are tidal energy and the energy produced in a forest.

These points bring us to where that research must be conducted. I will trace out the course of a timber that is to be

investigated. In the first place, it is necessary that the timber should be available in commercial quantities, sufficient to be exploited. That demands local information. Secondly, we want information from many points of view with regard to the timber, and this can only be got by collecting in the country of origin the experience of the people who have used that timber possibly for centuries. That, again, demands local inquiry.

Even if we have a research institution in the country of origin, it is necessary, for several reasons that I will go into in a moment, to have research at the place where that timber is being used most largely, that is in the centre of the Empire. England is the largest consumer of timber, but it is obviously necessary to have a central research for timber where a colony has not got a research institution.

I believe that there are several reasons why we should have a central research institute for testing this timber, even where the country of origin has one. First, the timber that is imported into this country is far in excess of that used in any other. We must have the closest touch with the man who manufactures the article, or uses it. Secondly, practically all business men look with extreme scepticism on all official documents, but especially at reports with reference to the products of the Empire of the country from which they emanate, and I have no hesitation in saying that a report on timber coming from the country of origin is viewed with grave suspicion by the timber merchant, and very often, I must confess, rightly.

Thirdly, there are difficulties of nomenclature and we must have men who have actually worked at and are personally familiar with the timbers to settle them.

Again, the behaviour of wood varies with the climate in which it is used.

And again, when substitutes are called for, if we have experts here who know the various qualities of wood, we are much more likely to provide proper substitutes.

Lastly, the research institute must be central in order that we may have the advantage of a larger number of specialists of various underlying branches of science, and a larger number of postgraduate students who can discuss every problem in detail.

Finally, I must emphasise the importance of advertisement and propaganda being carried on in addition to the actual research work.

Professor STEBBING : As regards combining training with research, consider the training of your young forester. His three years' training at a University has got to be somewhat intense in these days; your men will have to work from 9 till 5, with an hour's interval for luncheon, during the term, and then to spend all their vacations, as they do, in practical work, in order at the end of that time to get their diploma or degree. I would then send them to the Imperial Research Institute, and that Imperial Research Institute would give them specialised

advanced classes in the different branches of science, according to the desires of the Government that had selected a particular student as probationer for six months or a year. For the home service you might like to give them two years' extra course on top of their degree, as is done abroad. As regards India and the Dominions and the Colonies, they could give extra courses as required in their own countries, but even in their case, I should myself advocate, supposing I were training a youngster myself, that he went first to the Empire Research Institute in this country, took specialised courses, and then went to his own country and, if so desired, he could there undertake a course of training in the local conditions and local sylviculture.

Secondly, the Empire Research Institute would be of great use in providing specialised courses for men coming home on furlough, after ten or even twenty years' service. Many of us in the past have been to Germany or France for this purpose, but there we were practically unable to do any research work, but a central institute would enable officers coming home to undertake courses in research.

And thirdly, of course, your Imperial Research Institute would be carrying on research. It would be the centre of research in this country; it would be a centre to which research carried out at the Research Institutes in the different parts of the Empire could be collated, so that, we will say, a South African officer coming home from his Research Institute, which we may hope they will have in South Africa shortly, would be able to ascertain what had been taking place and the research that was being carried out on similar lines at Dehra Dun.

Mr. PERREE: With regard to this subject I may explain, perhaps, how we stood in India. For many years we organised and constituted a forest estate. Then we took up the work of restoration of that estate. Then we were faced, naturally, with the problem of the utilisation of our products. It was, therefore, necessary that we should instil into all the students who came to our college a thorough responsibility as regards the development of our resources, for we wanted more money in every way, and it was only by making money that we could go on expanding in the way that we should.

Thus the utilisation of our products and the research to which that led came rather late in our service, whereas in the Dominions it was the utilisation of forest products that brought home to them, more than anything else, the necessity for a forest service. They had fully established forest industries before they created forest services. We had not. So the standpoint in India and in the Dominions is quite different.

As regards research work, we have found that we cannot by any means undertake at one centre the whole of the research for the Indian Empire. In sylviculture we had originally intended to have a comparatively large staff at Dehra Dun, but soon after the scheme was sanctioned we realised that it was quite impossible for our staff, who had really no *locus standi* in the Provinces

other than that of experts and advisers, to carry on the true sylvicultural research. Therefore, all Provinces have had to develop their own sylvicultural research. Similarly Burma, and in another way the United Provinces, have had to develop their utilisation research. The United Provinces have gone to the stage of commercial research, that is to say, they are testing on a commercial scale the possibility of introducing new industries. That takes us perhaps a stage further than we have hitherto considered in this Conference, and there is no doubt that it will have to come. But I think I may say, as regards India, that Indian Officers present would not at all object to the utilisation branch of research being conducted at the trade centre of the Empire, and, therefore, being located outside the main educational and sylvicultural centre.

Mr. LEAVITT : The feature of our work in Canada is absence of centralisation. We do not, as you know, have a single centralised Forest Authority in Canada which handles the whole situation throughout, and, therefore, it is not a logical development for one single organisation to undertake to handle sylvicultural research and research into forest products and education.

Our educational work also has developed at a number of different centres, and for so large a country as Canada there are very distinct advantages in having a number of forest centres. The research work and the teaching are not, as a matter of fact, linked up, and I question very much whether it is feasible for them to be linked up. For example, it is difficult for the educational institutions to get money enough to furnish the staffs that are required for the teaching work, to say nothing of carrying on a programme of forest research.

Further, our observation is that sylvicultural research ought to be carried on in the woods rather than in the towns. We have, therefore, this position :—The administrative organisations have taken up the research work to a certain extent and the Commission of Conservation also, so that the two are being handled independently, and the research into forest products is being handled by the Dominion Forests Branch, so we have the three quite definitely separated, and it is not a very feasible thing, even if it were desirable, to undertake to bring them together.

I think the experience of connecting together practical teaching and forest products research, both at Madison and Montreal, is that it is not very practicable. The research man should be a specialist in research and I have been told that in actual practice the attempt to have the research man carry out teaching has not been a success, even where it was undertaken merely as a side line. The sylvicultural research, of course, has to be carried on during a considerable part of the year in the woods. That conflicts with the duties of the teacher, so that for these various reasons, our organisation has not worked out in a centralised way.

Mr. CUBITT : The ideal certainly seems to me to be to have education and research together without, of course, preventing

the local research which has been spoken of just now. Moreover, I consider that education and research should, as far as possible, be in a commercial centre. The reason for this opinion is that the machinery for education and the machinery for research, and the machinery for bringing to the notice of the public what the Forest Department has to dispose of, really overlap. It is also very strongly held that Research Officers should teach, as by so doing they keep themselves more easily up to date. Also, it seems to me obviously advantageous for the students themselves to be close to museums and to the Research Institute, so that they may have the benefit of the knowledge which from time to time Research Officers acquire. It also seems to me that the combination of education and research must lead to economy for the reason that the machinery of which I speak can be utilised for both. These reasons all point, to my mind, to the desirability of the combination. The extent, however, to which it can be made seems to me to depend very largely on the size of the country concerned. It is perfectly feasible in a comparatively small country, such as the Federated Malay States, to centralise education and research, and the exhibition of our forest products, but, of course, it is not easy in such a large country as India.

The CHAIRMAN : Arising out of the discussion which we have had, I think we can say that there is a very clear distinction amongst many who believe in the linking up of research and education on the question of the special consideration that should be given to wood technology and the forest products side as opposed to what I might call the research problems which go to the actual production of timber. Certainly a strong case has been made out by Mr. Groom, I think, for his position of the importance of having the timber utilisation side in close touch with the users at the centres of industry.

We will now consider the higher training of forest officers in the British Empire, and I will call, in the first place, for opinions from those parts of the Empire which have not got training institutions of their own. They very likely can take a dispassionate view of the higher educational position and can tell us what sort of training they require here, and how they think it can be best conducted.

After calling on them, I will call on some of those representing various Universities to give criticism and their views on the subject of the training of the higher Forestry Officers. We must remember that we have to deal not only with the actual training, but also the question of refresher courses comes in, and the question of certain specialised lines of investigation which might go on in the same place with research work.

THE TRAINING OF THE FOREST OFFICER.

Mr. H. M. THOMPSON (Nigeria) : As far as the West Coast Colonies of Africa are concerned, I think we are all in agreement with the idea of having our men trained at the home centre. At present we get our recruits from the three universities which give a course of training and a diploma, or a degree, in forestry, but I

think it would be in many ways preferable if the training could be given at one centre so that it be a uniform system, and people would come out with the same traditions and ideas on the subject.

England, of course, is very favourably situated as a centre of that sort, being close to the Continent, where some of the best methods are being evolved. We have got absolutely no training centre of our own, but I think that, hand-in-hand with education in England, we should have a local research establishment, on a small scale, for carrying out research work that cannot very well be done in a large centre in England.

Mr. EDWARD BATTISCOMBE (East African Protectorate): I would like to say, as far as our experience goes in East Africa, that we should be most particular in getting post graduate men. It is most important that we should go in for forest propaganda. If that is to be done successfully we must have men thoroughly educated who can speak to all and sundry on equal terms. If we are merely to have men who have been to a school, however good, and go straight to some central forest training school, they will not have had their minds enlarged; they will not have had the chance of meeting men from other schools and they would naturally be very much more narrow minded than the university men.

There is a point in connection with this, namely, expense. It is very hard for people to send their sons to the university and then, after three or four years, send them for two years' further training. The various Governments should consider that in determining the salaries to be paid to foresters.

There are three branches of forest education: forestry pure and simple, forest engineering, and the commercial side of forestry. It appears to me that men who wish to specialise in any one of these three branches should be given the advantage of doing so, and I think the Colonial Governments should either give grants, or give special leave, to enable men to go to the United States, Canada, or India, or to other Colonies where they really can learn and see the different sides of forestry being carried out under the very best men.

Mr. C. E. LEGAT (South Africa): In South Africa we recognise that, in order to manage our forestry estate to the best advantage, it is necessary to have in charge of the estate men with the highest qualifications and attainments. In order to obtain that, we are anxious to send men of university status to forest schools abroad, as the forest area in our country is too small to justify the establishment of a forest school in the Union. Possibly we might send the men to Australia if they establish a good sound forest school there, because the conditions in Australia are very similar to those in South Africa, and the trees that we grow in South Africa are to some extent the trees from Australia.

At the same time, we recognise that even a very well equipped Australian Forest School would not suffice for the complete training of a Forest Officer. In Australia there are no forest demonstration areas; there are no forests which have been under regular

management for a long series of years, and we recognise that it would be desirable that students should come to Europe to complete their studies, as there they will be able to get mind pictures of what a properly managed forest should be.

As far as forest training in this country is concerned, the Union would be anxious to send the men to such centre as would turn out the most efficient and best equipped men. From my own point of view, I think it would be very much better if, in the United Kingdom, there should be one well-equipped school to which candidates could be sent, and it would seem that there is bound to be some waste of money and energy involved in having a great many schools if one will do.

In regard to refresher courses, I feel it would be very useful for men who have been engaged in the practice of forestry for many years in the remote parts of the Empire to have an opportunity to come to the centre of education and gain information as to the latest development of forestry science, both silviculture and technical.

Mr. D. JAMES DAVIES (Newfoundland) : It seems to me that, when you speak on the subject of forest education, it would be vastly beneficial to forestry in general if you could discuss for a very short time the advantages of educating the general public in forestry matters. I say this because I have been so very much impressed with the enthusiasm of foresters that I would like, if it were in any way possible, to try and transmit some of that enthusiasm to the general public. I think if you could prevail on some of the schoolmasters, whose schools are situated in our timber districts, to give short courses, they might be able to transmit some of that enthusiasm to the growing generation. If that could be done it would be of great advantage to forestry in general.

Mr. W. DAWSON (University of Cambridge) : I have formed the impression that the Forestry Commission have attempted too much when they attempted to run forestry from the centre and go beyond the scheme they were appointed to do, namely, the development of forestry in this country, for several gentlemen have pointed out already that a general scheme would not suit their conditions.

Looking at the question generally, we have to consider, first of all, what is the aim of forestry education. Is it the production of half a dozen, or more, Forestry Officers, or is it the education of the owner or agent in whose hands 97 per cent. of the timber of this country now is? The official view seems to be that the education of the Forestry Officer is the all-important thing, and that the raising of the level of the knowledge of the owner or the agent is of secondary importance. I think, on consideration, it must be admitted that forestry would be advanced to a far greater extent, the woodland areas would be increased, and the existing woodlands improved, by the education of the owner and the agent.

Then, secondly, on the one central principle which is the point really under discussion, you can only educate the owner of the woodlands by permitting the education to take place at more centres than one, because land agents and land owners will not go to a forestry centre, but they do go to the University at the present time. Moreover, under the one centre system, the teachers have themselves been taught in the one centre, and so it goes on generation after generation, the teachers producing the same type with no open competition whatever, and the result of this is seen in those countries where the single system prevails at the present time. I am speaking from professional knowledge of the schools on the Continent, and know that the type of man produced is now practically what was produced 50 years ago because there is no competition, because there is no inducement for him to discover new things; he is turned out as a machine.

The conditions in England are peculiar, and more than anywhere else is there a demand for what I might call forestry centres. On account of the position, surely it is to the benefit even of the Forestry Commission itself to develop forestry. Their object and aim is to develop forestry, not to create State forests. If they can do so, and avoid buying land, such money as they have will go a longer way than if they have to buy the land.

The third point I wanted to touch on is that the system of maintaining a single centre inevitably brings with it the principle of selecting probationers for training for special posts; you earmark your officials without giving a chance of proof whether they are suitable for the work they are to undertake.

But by the system of training at more centres than one, the Forest Authority and various Governments have the choice of a large number of men who have already proved themselves suitable for the work.

I have a strong opinion that things will not be satisfactory if the training is taken *en bloc* at one centre. The conditions in different parts of the country differ, and the conditions within the Empire are still more divergent.

One point I should like to mention is, that to confine the lecturing to one centre is vastly more expensive in the end than equipping various centres which are already in existence and which have already done work under conditions where they received no encouragement. Now, the proposal is apparently to sweep away all the unselfish efforts of the past on the part of the numerous institutions and really to limit education instead of extending it.

Professor STEBBING (University of Edinburgh): I should like to endorse what Mr. Dawson has said, that money has already been spent to a very considerable extent by the existing institutions. The training now given also is on a very advanced scale and the men turned out have proved satisfactory.

I am also of opinion that it would be rather a retrograde step to go back to one centre instead of leaving centres who have made themselves efficient to cope with the work. The question of

money comes in, and I understand it is this question of money which is influencing the matter. The additional sums required for the centres now at work are comparatively small, and that being so, you have the rest of the money that can be devoted to this purpose to sink in research and in extra specialised courses, which I feel absolutely convinced the young Forestry Officer will require for the future.

The Forestry Commission should be able to give assistance in bringing into being a place where this class of work can be given if it is required to be centralised, because I feel sure India and the Colonies would assist with grants-in-aid. Should it not be possible to form such a centre, any courses of this nature can equally well be given at the centres in existence.

Mr. MACKAY (Australia) : We have in Australia decided for good and sufficient reasons to establish a Forest School in Eastern Australia in the forest and not in connection with Sydney or Melbourne University. We hold that a better and more practical training can be given in the forest, where practical demonstration work can be regularly carried on. We are fully alive to the advantage of University training, but we do hold that the training in Great Britain, excellent as it is in various Universities where such courses have been carried on, would have been much better if they had had the advantage of a well-managed forest under observation and systematic working for a long period. We prefer to follow the French rather than the German system, and therefore we support strongly the institution of one superior Forest School in Great Britain not linked to any University.

As regards our own forest school in Australia, we only propose to enrol 16 to 20 at most, probably 16 students at first. The most distinguished of those students, a selected number, may be sent to Great Britain to complete their training, but we hold that they should be sent to one central institution here where they can get the advantage of a highly systematised training, and where, if there is any difficulty arising from the absence of well-managed forests of large area over long periods, they will be able to go, as in the past, to France or Germany to get a thorough insight into this essential feature of forestry.

Mr. ACLAND : This is an extraordinarily difficult question, but I want the delegates to see that we in the United Kingdom have had to consider it, so far as we have been able to consider it, not from the point of view of what we should like to be able to do, but from the point of view of what we can do with limited funds available. Now, I believe there is not a Head of an institution of higher forestry training probably in the Empire who would say that his institution was yet half as good as what it really ought to be from the point of view of doing the work that ought to be done. I am sure that several professors of forestry in this room would be the first to get up and acclaim that they are half-staffed, half equipped. They have professors doing magnificent work, but doing it under quite terrific odds and difficulties owing to the

absence of sufficient money which will give them the staff and equipment of the laboratories and the facilities which they really want.

What have been the conclusions of many of us here to-day as to what a place of higher training ought to be? That there ought to be, in addition to the best possible training courses, real, thorough provision for post-professional work. I mean that after a man has had five or six years of his actual profession it should be almost a rule all over the world that he should be let off for a year to come to some centre and realise that his profession is as much a growing thing as the trees which he is planting, and he should be able not only to learn the stuff as he learnt it as a student when he did not know really what forestry was, but should learn it always having in his mind, "What is there in this which I can really apply to the circumstances which I know and to which I am accustomed?"

I had a chance of being trained as a teacher and I was trained most scientifically in Germany. I did not happen to adopt that profession, but I know perfectly well that if I had I should have wanted to go back to my school at Jena five or six years later and say, "Now I know what a classroom is, how can I apply this psychology and pedagogy and method and all that which I have learnt?"

That has been done splendidly well, I believe, in connection with the training of doctors in the Royal Army Medical Corps. They all come back after they have had five or six years of their work to go through admirable courses.

Very well, if that sort of centre has got to be made available somewhere, and probably got to be united to a centre of ordinary training, what are poor people to do who have only got limited funds at their disposal? With every respect and admiration for the claims put forward by the professors of forestry, can you really go, as a practical proposition, to Offices like the Colonial Office and the India Office and say to them that it is their duty to produce money to render first-class, not one, but several institutions in the United Kingdom, as well as no doubt helping those abroad in this matter?

The steps of my argument are therefore these: limited funds (that is true of the Colonial Office and the India Office, just as it is true of the Treasury of the United Kingdom). Secondly, we have got nothing now which is really first-rate and nothing now which gives that provision for post-professional work which we want. Thirdly, we ought to have something somewhere in the Empire which is really first-class in every way. If therefore those are given as data, is there any practical alternative at all to trying to concentrate somewhere instead of, as Professor Stebbing suggested, simply equipping a few special courses wherever they may be required in existing institutions? We should like to have first-class places everywhere; we cannot; but we must have a

first-class place somewhere and we believe that we can; that is all I want to say.

Sir WILLIAM SCHLICH: We have just heard what is really required. I will simply fortify it, if fortification is necessary, by my own example. I was commissioned to start a School of Forestry at Cooper's Hill by the Secretary of State at the suggestion of the Government of India. For the first four years I was entirely alone; I had to lecture to different classes, to instruct them in practical work in the forests round about; when the holidays came round I had first to go and talk to a junior class on an excursion of several weeks, and then I deposited them with their beloved parents to spend the rest of their holiday, and took the senior men and went for another six or seven weeks' work with them. I was alone. With the greatest difficulty I got an assistant at the end of four years (the poor man is now dead), and that lightened to some extent my work.

But what was the consequence? We had a special instructor in Forest Law, a man who was paid the moderate fee of £100 a year coming from Oxford to teach our students Forest Law with special reference to India. As soon as they gave me an assistant what did the Secretary of State do? He said "You are two now; we will cut off that lecturer and one of you must teach the law." Neither of us was exactly a trained lawyer but I made the best of it. We had also by that time some help on the Continent for the practical instruction, and the Secretary of State said "We will cut off that, too; you are two now; one will take the law and the other will take all the work on the Continent during the vacation as well as in term time."

Then, later on, after some time at Oxford, everything was thrown over to the three universities. Why? Because one or two universities offered to do it free, gratis and for nothing. The result was, I was thrown on my own resources and I had to work for myself, and I did. Rather than let the school go to wrack and ruin I offered the university to do it for nothing, at any rate, if they could not find any pay for me. They found me a moderate salary and then I said I must have a little research. I scraped and saved together the money and established a little research in addition; and this example will show you what we have to look forward to if we try to support a number of establishments. The great point is to have one thorough establishment as Mr. Acland has told us, and if we depart from that principle I think we are going to make a great mistake.

FOREST ENGINEERING.

Mr. M. A. GRAINGER (British Columbia): I want to make an appeal for wider training in the interests of the forestry profession itself. In many parts of the Empire I expect the need for logging engineering knowledge and for knowledge of the industries is not felt so much as it is with us, but the time will come in every

part when foresters will feel the need for more of that knowledge. It concerns us in this way, for instance : one of these companies wants a big area for railway sleepers, and we know that they are the only bidder. We have to send parties up to examine and value the area and they come back. The company says the price we ask is too high and that they cannot afford to pay 6 cents a sleeper—to give you the exact figure. We send another man up to apply such engineering knowledge as he possesses, and we eventually reduce the price to $3\frac{1}{2}$ cents. We do not want to soak that company; you cannot do business with operators if you soak them, and at the same time you do not want to be done by the company. In a case like this, you can only defend your position if the judgment of the man who made that valuation is good as to the expense of extraction. The whole prestige of the forestry profession rests on that man's ability. The forester must have a competent grip of what logging costs, so as to protect the profession from charges of graft and inefficiency.

Secondly, when the forester goes into the woods about his work, if he is to do his best in the interests of the forest itself, he must have some trained power of observation and imagination from the utilisation side. He must know what is defective in the utilisation he sees going on and why waste occurs. He must realise that low utilisation values create waste and he must be thinking hard in the interests of the forest itself, and also in the interests of the industries to see what can and what cannot be done commercially to improve conditions and save this appalling waste that goes on. This involves some training in lumbering knowledge.

The third point is that the forester with commercial imagination must be behind the products expert in order to help him to work in the right direction. As an instance, certain tests were made of a certain timber and the expert, very seriously and with the exuberance of the specialist, started to analyse carefully what soil that timber had grown on. He took the strength of the wood at the butt, then 20 ft. up the tree, then on the North, South, East and West sides of the tree, all very interesting may be, but as a commercial test of timber as it is marketed, the whole thing was rubbish.

The training is not to make the forester a logging or a products expert, but to enable him to use and to direct the work of specialists; to give the forester the right frame of mind so that he is not contemptuous of the utilisation side; to make him realise that it is the fundamental duty of every forest service, sooner or later, to include a commercial utilisation section in it.

The CHAIRMAN : We have had a useful discussion on education. You see the cleavage in ideas which lies between those who believe in the higher training at one centre, and those who believe in the present spread of higher education over a good many centres. I do not propose to enter into that point now, but I

do, however, wish to make one statement, and that is, that the Forestry Commission of Great Britain are fully aware of the importance of private forestry in this country, and that they regard the education of the land agent and the working forester as an important part of their educational work; further, that they intend to spend a sum, which will probably amount in 10 years to something like £200,000, in the education of working foresters, land owners and land agents, etc.

One figure I would like to quote. The total amount of education demands that are at the present moment being made in this little country of ours, Great Britain, amount to just half-a-million out of a $3\frac{1}{2}$ million grant for a 10 year period.

RESEARCH.

Mr. A. RODGER (Indian Forest Service): My excuse for addressing you on this subject is that I have had a good deal of experience on the Continent of India and in Burma during the last nine years. You have heard from Mr. Perrée that we have had a large Research Institute at Dehra Dun in Northern India, which has done excellent work, but it is now apparent that its members cannot carry out the work that we require all over the Indian Empire.

The tendency in India now is for each important Province to start its own research in collaboration, of course, with the parent central institution at Dehra Dun. Some of the Dominions have done a great deal of research, and I would urge that every Colony, however small, should start its own research work in the five main divisions which I take in the order of their importance—Sylviculture, Economy, Forest Engineering, Botany and Zoology. I believe that these will be of great value, however small may be the beginnings. We must realise that in some of the smaller Colonies of which, unfortunately, we in India have little knowledge, there will be a great difficulty in starting anything, but I honestly believe that if the Chief Officer in charge of each of those Colonies starts his Institute, it will be something. However small they may be, they will stimulate interest in forest problems in a fair proportion of the population, and among the whole of the staff. They will be able to collect information which will be available to all those who are interested in developing the trade in forest products.

The Burma Forest Officers, after long discussion in our small Province, have adopted the course advocated by Mr. Acland, namely to separate the purely scientific part from the economic research which we have decided will be mainly carried out in Rangoon where, as you all know, commercial interests, especially in forest products are very great indeed. In conclusion, I should like to impress upon you Mr. Acland's most excellent motto *Ligna non verba*.

Mr. LANE POOLE (Australia): From the Australian point of view, we hope to establish our own Research Institute, but, of course, there is every advantage in the world in having a central

institute in England which can correlate our work with theirs, and also we should get in touch with the great manufacturing industries in this country and thus help ourselves to put on the market those timbers which at present we have a difficulty in finding a market for. We must really do our research work in our own country, but we do want a centre here, a sort of clearing house to deal with the product after we have made our investigations.

Also at the Central Research Institute, if it is to be established in England, a great advantage would be the standardisation of methods. We are all suffering very much through carrying out our research work on different lines. Merely in the matter of timber testing, the standardisation of that would go far towards giving us figures which we could compare. At present they are not comparable. The moisture contents of timber in various research institutes is not the same. Even between two States in Australia: one took one moisture content for testing timber and another another, and the figures of strength and so forth were not comparable.

The CHAIRMAN: Then we may take it that the point Professor Groom made, that it might be advantageous from the point of view of the Dominions or the Colonies to have this wood tested by a second, and probably unbiassed opinion, might be of value to the exporting country.

Mr. LANE POOLE: Certainly, I quite agree with that.

The CHAIRMAN: Is that your view in Canada also?

Mr. GRAINGER: Yes.

The CHAIRMAN: It seems to be a good point

Dr. MUNRO (Entomologist, Forestry Commission): I think that, whether or not you have other research institutes, it is a necessity that you should have one research institute to which all the authorities' problems can be referred in the first instance.

Mr. W. DAWSON (Cambridge University): I disagree with Dr. Munro's remarks, because there are many problems where the services of a specialist, rather than of a forester, are required in investigating the pure science side of them. You can get that at the Universities where individual men are quite willing to undertake such problems. At Cambridge one of the Professors has done more to advance agriculture than any living man through his investigations. I am of opinion that, as far as research is concerned, at all events, it must be linked up with the University where you have your scientifically-trained men to deal with scientific as against other problems.

Professor A. HENRY (Royal College of Science, Dublin): The word "research" covers probably two lines of work. There are investigations involving the carrying out of observations and experiments over large areas and for long periods of time. Research on a considerable scale of this kind can only be carried out by the Forestry Authority, because it costs a great deal of money. I found when at Cambridge that with our £400 a year

of income we could not travel about the country and take all the measurements that were necessary for establishing yield tables. Such an investigation is expensive and requires a considerable staff. There is, however, a good deal of valuable research which can be carried on by one man, either alone or with the assistance of a trained student; and such research involves little expense. I have not the same dubiety about the Forestry Authority assisting research as some people seem to have. In spite of Mr. Acland's expression about the necessity of restraining the exuberance of the scientific spirit, I am sure that he and the Forestry Commissioners generally will assist me and others like me by giving us help when we are engaged in trying to solve problems which do not require a large staff or great expenditure of money. For example, take the question of ring shake in chestnut. It is important to know whether one ought to cultivate chestnut or not in a given locality. It is a tree with a very large yield which grows splendidly in the milder parts of this country. Such investigations as I have made seem to indicate that that ring shake is caused by the extraordinarily severe frosts that occurred in years like 1879 and 1860, and if a sufficient number of sections of chestnut are sent to me from different parts of the country when the trees are felled I can count back the rings to the year of the shake, and I can establish whether shake does occur only in years of great cold. If shake is due to severe winters, it is evident that the growth of chestnut on a long rotation cannot be successful except in the maritime belts where there is never extreme frost. In such a research as this, I am sure that the Forestry Commission will give help. They will send specimens of the wood required. They will ask their officers to collect certain data; and they will probably give us now and again some funds when we have a student who is remarkably good at research. When I was at Cambridge I lost one of the best students that forestry has ever lost. He went to another subject; I could not even get him an endowment of £100 a year for two years. One could obtain money for buildings, but nothing to assist a brilliant student. I hope then if a good research student turns up that we shall be able to obtain for him a scholarship for a period of one or two years.

Mr. PERREE: I do not think anyone would wish for a moment that isolated research should not continue; in fact, it should be encouraged. But owing to the fact that you cannot possibly take up all subjects at once, some being of greater importance than others, there should be some directing authority, preferably in this case a Forest Authority, to decide the order of importance in which research should be conducted.

Mr. GRAINGER: I hope that products work, for instance, at a central place like England, may be handed over to some scientific institution where the necessary investigations can be made. Our viewpoint is that there must be somebody behind all this products work and experimentation who visualises the thing in a broad

way as the defence of the legitimate markets for wood, because wood in some cases is being attacked by and is being pushed out of its legitimate market, and that hurts your forest. The way the matter is tackled over there is by giving service to the consumer, making wood most useful to him and seeing he uses it in the best possible way. Unless that spirit is behind the experiments which are made, they are going to be just cold-blooded experiments which are not going to help the main cause.

The CHAIRMAN : Gentlemen, I think we would all like to say a good deal more on this very interesting subject, but I think the time has now come for bringing the discussion to a close. We have had a very frank statement of views, and I think that anyone would be particularly impervious to ideas if he went away from this discussion without, at all events, having had a good viewpoint of the opposite side of the opinion he may hold. The question of education and the question of research are undoubtedly two of the most difficult questions which any forestry body has to meet. I only wish that we had had more time at this Conference to have gone more thoroughly into them. I do believe that a good many of the differences of opinion lie to a very great extent in the question of the original difference of view.

I believe that we are agreed that we must get our education and research into a position worthy of the Empire. I am quite certain that all of those who work towards it will do so with the absolute intention of achieving their result, and that they will not be biassed by the past.

We here in this country undoubtedly have a very difficult position. We have had it made difficult partly by the question of nationality, which I can assure you gentlemen who, perhaps, do not know this country as well as we do, is a very important matter. We have it made difficult by old institutions to which we should all like to give every assistance, and, finally, we have it even made more difficult in certain cases by old, unfortunate quarrels in which none of us here had any part. Therefore, I hope that, in discussing this matter frankly, as we have, and covering all the views from different parts of the Empire, although we outwardly appear to hold very different views, I think I can say for all foresters here, we are determined to aim at the same result—something worthy of this great Empire to which we belong.

FOURTH DAY.—Wednesday, 14th July, 1920.

TERMINOLOGY.

PROFESSOR TROUP : During the course of lecturing in recent months I have been faced with a very considerable difficulty, and that is that technical terms used in forestry are so variable that to express any particular idea it is often necessary to employ two or three phrases, both

meaning the same thing but different in words. To take the working plan terminology alone, in India we have well established terms in common use which are not in any text book and which are not recognised in Great Britain, for instance. I will not enter into details, but you will have to take it on trust that such is the case.

Now, the Americans have already gone into the question of nomenclature. They have got a society—as far as I remember, it is called the Society of American Foresters, or some similar title. They have had a Committee on Nomenclature and they have published a list of technical terms used in their forestry in a back number of one of the American periodicals—"The Journal of Forestry." I have a copy of it at home; I am afraid I have not got it here.

Then in India we attempted some time ago to standardise our terms, and brought out a bulletin with a list of technical terms. That, I am quite certain, wants a good deal of revision to make it applicable to the Empire as a whole. I think the only way of dealing with this subject is to follow the example of the Americans and to constitute a Committee. It is rather a big work; it cannot be got over in two or three days, but it might be got over, say in the next few months. It may require a certain amount of correspondence with local officers in different parts of the Empire, and that will probably constitute the chief cause of delay in bringing out a comprehensive list.

Mr. F. R. S. BALFOUR (Scotland) : Probably in Western America one finds the variation in the nomenclature of trees worse than elsewhere. In Eastern America it is bad, but in Western America it is dreadful. There is no lumberman and no timber merchant in America hardly who knows the real name of any tree that he is felling or cutting up. In America and Canada the "Red Cedar" is used for the following different timbers: In British Columbia, Washington and Oregon "Red Cedar" is *Thuya gigantea*. In California "Red Cedar" is *Libocedrus decurrens*. In Quebec and the North-Eastern States "Red Cedar" is *Thuya occidentalis*. In the South-Eastern States "Red Cedar" is *Juniperus Virginiana*. So there you have the same name not only for four different trees but four different genera. Yet if you asked a timber merchant for red cedar he might sell you any one of those four trees.

In the same way, in British Columbia and Alaska "White Cedar" is *Chamaecyparis Nutkatensis*; in California "White" or "Port Orford" Cedar is *Chamaecyparis Lawsoniana*. Whereas there is no real cedar in either Canada or the United States! Western lumbermen apply the term "White Fir" to *Abies nobilis*, *A. grandis*, *A. Lowiana*, or *A. magnifica*, indiscriminately.

I myself have been put to very great inconvenience. I was taken by a timber man on Paget Sound to see the Western Larch on the east side of Mount Rainier. It had never been reported in

that area before, and I fitted out a trip with horses to that region. When I got to the side of Mount Rainier I could see no signs of the Western Larch, but after two or three days he brought me a branch of *Abies nobilis*, which grows there, and said, "There, we have found the great *Larix occidentalis* which we have come so far to see! This is *Larix occidentalis*, the great Western Larch." Only two States away, in Montana, they were cutting the real thing, and here at this timber mill, belonging to the St. Paul Timber Company, they did not know a Western Larch from a Silver Fir!

In Scotland I recently found a carpenter cutting up a piece of what was evidently well-seasoned Scots Pine. I said, "That's a fine piece of Scots Pine." He replied, "It's a fine piece of wood, but it's not Scots Pine; I saw it unloaded at Leith from a ship which came from the Baltic; it's Baltic Redwood!" He was quite certain of that; there was no question of it being Scots Pine, because it came from the Baltic!

The same thing applies with hard woods imported into London. If you always knew the port of shipment you could possibly name the tree. There is an enormous quantity of *Fraxinus Mandshurica* from Japan sold in this country for American ash, and it is probably quite as good. In London there is also an enormous quantity of *Pinus resinosa* sold for the true Pitch Pine of South-Eastern United States of America (*Pinus palustris*).

I do not see that there can be any terminology other than the botanical nomenclature which would get over the difficulty. It is very difficult to get a lumberman to talk to you if you talk to him about the Latin names of the species, but I do not see very well how any other form of nomenclature can be adopted. I, therefore, advocate that the botanical nomenclature be adopted by lumbermen, timber merchants and the trade generally as being the only possible way to avoid the confusion and ignorance that now prevail.

MR. MACKAY: The confusion mentioned by Mr. Balfour as existing in America and Canada is also very common in Australia. There are at least four red gums, three blue gums, three mountain-ash species, and about four iron-barks. There abound timbers of inferior quality which are sold as iron bark: the difficulty lies in identifying the true timber, not merely at a port where large quantities are being exported, but in the interior where it comes into use for mills and public works.

Not long ago a case came before the Courts where blue gum was supplied for a large bridge. It was found that the so-called "blue gum" used in it came from a forest reserve where blue gum did not exist. Several witnesses in the interest of the contractor came forward to swear that blue gum did grow on this reserve; the Forestry Officer gave testimony that it did not, and that only one species existed there—and that an inferior species for this particular purpose. Despite this, the timber merchants were able to bring forward four independent witnesses to swear that the

kind supplied (Mountain Ash, or *Eu. Regnans*) was sometimes known as blue gum, and the Judge held that the balance of evidence was on their side, and decided against the Municipal Council which was building the bridge. The Council not only had to pay a very heavy price for the bridge and heavy legal costs, but further, had to accept much inferior and much less durable timber in the work.

As regards the affixing of particulars for export or use at home, I do not see how we can do anything beyond putting a Government stamp on it, and having some distinctive symbol for each species, which will be clearly understood and provided for by law in a Schedule to an Act, and which will compel sellers of timber to sell and export all timbers true to name.

Mr. C. LEAVITT (Ottawa): The British Columbia Forestry Branch has invented new names for particular Western species in order to get away from the curse that is attached to the previous history, and is trying to establish new trade names. We have a certain amount of confusion with regard to trade names. Not only is a single botanical species known by four or five different names, but, of course, as has been brought out, we have four or five different species known by the same trade name; so there is a great deal of confusion, and we have confusion with regard to the botanical names of the same species. As has been brought out, I think the tendency in Canada in that respect has been to follow the Americans. The Forestry Branch has adopted that policy, and that fixes our practice. We are necessarily tied up to the practice in the United States because our species are the same, and the timber is shifted back and forth, and that complicates the situation. If full consideration is to be given to this matter by a committee, it strikes me it might be very much worth while to get in touch at the same time with the American authorities to see if the whole thing cannot be straightened out.

Mr. M. A. GRAINGER (British Columbia): There is just that point about the names of trees. We find the difference in names a very serious handicap to business. Take the question of Western hemlock. Hemlock in the East means a poor timber; it is a bad name, and at times in the past when operators tried to market Western hemlock they ran up against the prejudice that this was an inferior weak wood like the hemlock in the East. With regard to Oregon pine, Mr. Macmillan, who went round the world as Trade Commissioner for Canada, visited an importer's office at Melbourne and talked about Douglas fir. The man said, "I am not interested in Douglas fir; I do all my business in Oregon pine, which I get from the United States ports of Hastings and Chemainas." Both of these are sawmills in British Columbia!

This man was looking to the United States for Oregon pine when he was really using Douglas fir from British Columbia, and he did not know it and did not want to know it. That is where some clearing-house for standardisation and information would be valuable.

Mr. FERREE : The question which I want to raise is whether we should not include all British-speaking countries in this Committee on Terminology. It is exceedingly important for the purposes of comparison and research that we should have similar meanings all over the English-speaking world; in fact, it is almost a matter of international importance, as far as research is concerned. There has been an attempt at international combination of research work, but, of course, that at present is entirely broken up. In time we may be able to revive this, but for the present I think we might anyhow try to interest all English-speaking countries in this very important matter of terminology, especially with reference to education and research.

It is not, perhaps, of such great importance from the utilisation standpoint, although I think that the line indicated by Mr Mackay, of having Government stamps on timber to indicate its exact nature, would probably overcome most of the utilisation difficulties.

Professor STEBBING : I cannot help thinking it will take a little longer than Professor Troup seemed to suggest to make up this dictionary of terminology, which is really what it will come to, because I think with Mr. Perree that it would be almost essential that it should be a common dictionary for the English-speaking Empire. Naturally one finds a great difficulty, and, as he rightly said, one has to paraphrase one's lectures and repeat the same remark using different words to make quite sure that it is understood. One constantly finds students from the Colonies and Dominions coming and asking exactly what was meant by certain terms that had been used—terms which were employed which are not employed outside this country and India. Therefore, I think, if the committee were appointed and some definite understanding come to on this point of terminology, it would then be necessary that this terminology should be decided upon by the committee and receive the stamp of the English-speaking Empire, and that doubtless the Forestry Commission could obtain in consultation with the heads of the Departments in the different parts of the Empire.

Professor HENRY : I think it will be a matter of extraordinary difficulty to get the United States, which is also a great English-speaking country, and England, India and all the Dominions and Colonies to agree upon forest terminology. In the United States and Canada they call railway sleepers "ties," and such common names, I think, cannot be changed. In the time of the Roman Empire it was decided to add two letters to the alphabet, but even the Cæsars were unable to do that. I think that all that can be done now is for each Dominion and Colony to decide with regard to the nomenclature to be applied to its own timber trees. I think it would be impossible to make a uniform system of nomenclature for timbers throughout the Empire and the English-speaking world. It would be a long time, for example, before we could displace the use in the import trade of the name of "Oregon pine." There is no real confusion; everybody who is interested in timber knows that Oregon pine is Douglas fir.

Mr. CLUTTERBUCK (India) : There seem to be two points now before the Conference in discussion ; one is the standardisation of terminology used for forest work, the other is the standardisation of trade names for timbers which the Empire has for sale. We have before a Committee—not that sitting at the present moment—a proposal to have a Central Research Institute and also a Bureau of Information. It seems to me that if the Central Research Institute and the Bureau of Information are brought into being, the first thing that both those bodies will have to do will be to decide upon the nomenclature they are to use, and terminology. The Research Institute, if it is going to direct the research all over the Empire, must bring into being similar terms for use everywhere, and it seems to me, instead of having a Committee, as this work will take a very long time indeed, if all the Colonies are to be consulted, the compilation of terminology to be used in future as regards forest work could be left to the Research Institute. In the same way, the chief work of the Bureau of Forestry will be, first, as a clearing-house for information ; secondly, for advisory work ; and, thirdly, for bringing the producer into touch with the consumer ; and, in order to do that, they must have some standard of trade names, otherwise the Bureau will not be able to do its work. Therefore it seems to me the first work for the Bureau to do would be to arrange with all the Colonies to have standardisation of trade names.

EMPIRE FOREST RESOURCES.

Mr. H. R. MACKAY (Forest Commission—Victoria) : The Committee which was appointed to tabulate Empire resources have had considerable difficulty in preparing a summary, as some of the reports from the different States are very defective. A marked feature of these reports is that often no rough estimate is given, even of the net increment in their territories, and therefore they have given no information as to the balance or surplus available in the existing forests. The figures*, however, show that as regards resources the Empire is certainly on the favourable side and has favourable resources yet unexploited.

I think the outstanding feature of this report is that the dependencies are agreed that they must have a thoroughly trained staff, they must exploit and develop their timbers to better advantage, and must have better methods of putting their timbers on the market whether in a raw or manufactured state.

THE POSITION IN THE DOMINIONS AND IN INDIA.

Mr. E. H. FINLAYSON (Forestry Branch of the Department of the Interior—Ottawa) : With regard to the statement which has been prepared for Canada, I think that it is necessary to point out that, after all, the data which we have so far collected in Canada are very meagre indeed.

* See Tables III, etc., in Summary of Statements presented to Conference (p. 289).

When the Committee who prepared this report asked me to consult with them for a few minutes with regard to the increment in Canada, I had some very considerable hesitation in making any definite statements, by reason of the fact that we in Canada know so little about the increment in the forest in different parts of the country. However, the committee were desirous of including something that would make it possible for them to fill out the table for the whole Empire. I think possibly in figuring the increment for Canada they were conservative; at the same time, I would like to point out that off-setting our total increment we have an enormous loss from fire and decay, the extent of which is not very well known in Canada. We have for some districts, some provinces, and the North-west territories, very meagre statistics as to our losses.

I desire to point out I would not like to have these figures taken as having been submitted by Canada as an actual expression of something that we have come to very definite conclusions upon.

MR. C. LEAVITT (Chief Forester, Commission of Conservation—Ottawa): I am afraid it is not possible for us to furnish anything in the way of definite information without going into considerable detail. I might, however, in addition to the point brought out by Mr. Finlayson, refer to what I understand to be the fact, that this estimate of total supplies includes a very considerable amount of material which is commercially inaccessible at the present time, the exploitation of which is a matter for the indefinite future, if, indeed, they are able to get to some of it at all.

Further, it is a well-established fact that in the matured virgin forests the increment is offset by the ravages of insects and fungi, so there is no real net increment at all in such case. And, further, in uneven forests it is extremely difficult to make any kind of estimate as to what is the net increment. The increment of our coniferous species which, of course, are the most valuable, is decreased by the growth of comparatively valueless hard-woods in the more remote sections, so that the situation is so complicated that it is almost impossible to tell what is our net increment.

Great areas have been destroyed by fire. We have either an area which has been rendered barren by repeated fires or an area which is re-stocked with young growth, and which will, at some future time produce new forest; but the territory is so large, and the studies which have been made so limited in extent, that it is really impossible to tell very much about it. We did make a definite attempt to try to get something done with regard to the question of pulp wood supplies in Eastern Canada. There was an intimation in the *London Times* a few days ago by Mr. Haskall, one of the vice-presidents of the International Paper Company, in which he referred to the attempt which had been made through the Underwood Resolution to secure the removal of the restrictions on the export of our pulp wood from Canada

to the United States. I might say, however, that those restrictions do not apply to timber cut from freehold land, but do apply to timber cut from Crown lands in the Eastern Provinces. That matter was referred to by the delegate from Newfoundland the other day. The attempt that was made by the International Paper Company before the Foreign Affairs Committee at Washington presupposes that there is a large amount of net increment in the pulp wood which would justify the removal of those restrictions; and we endeavoured to get together the best data we could to show that the statements of the company were absolutely untrue, and that the Canadian Authorities were more than justified in retaining the restrictions on pulp wood obtained from Crown timber land.

So far as Canada as a whole is concerned, we really do not know at all what is our net increment. British Columbia is certainly in the best position. Only a start has been made towards the exploitation of British Columbian resources, but in all the other Provinces the forest resources are limited and the desirability of greatly increased exploitation is doubtful until we get better fire protection and get to the point where we can carry regulations into effect governing the methods under which the timber shall be cut.

We have in some of the Provinces in the East the diameter system of regulation which is enforced with varying degrees of success, but the real practice of silviculture has hardly begun anywhere in Canada as yet; so until we get that we cannot bank much on net annual increment, and we are mostly going on virgin supplies.

Mr. M. A. GRAINGER (Chief Forester, Provincial Forest Service, British Columbia): Only those who have been concerned with the compilation of the original figures know the guesswork which is at the bottom of them, and I am a little worried about the effect on the public mind of these queries.

The CHAIRMAN: I am sure I represent the views of the delegates here when I say that before anything is published it is essential that we very clearly lay down the difference between hardwood and softwood resources, the degree of accessibility or non-accessibility. That should be borne in mind, as far as possible, during the rest of our discussion.

Mr. A. J. GIBSON (Conservator of Forests, India): It is absolutely impossible to gauge the potential wealth of our Indian forest resources. The provincial figures varied enormously; Conservators who have been years in charge of a circle burked the question. Many provinces stated "no figures available," but we had to make the attempt and my only care was to base the estimate on a very conservative figure. The forest area under State Control is 126,000 square miles, and in India I may say

we adopted as the definition of "forest dedicated to timber production" forest capable of being worked commercially, if not now, then in the immediate future:

The provincial figures averaged $12\frac{1}{4}$ cubic feet per acre per annum; they seem to be on the low side; they agree with my own experience of nett increment from various types of forest. That gives a total gross increment of 1,212,000,000 cubic feet for the whole of India. Deductions had to be made for fire, waste and decay, and we thus get our nett increment of 1,177,000,000 cubic feet. I am not in a position, without reference to records, to say how much of that timber is softwood and how much is hardwood. I may say I have been working on this question for the last six months and I have arranged to survey, at any rate, the coniferous belt of the Himalayas, which covers an area of about 9,000 square miles.

Sir CLAUDE HILL (India): In my experience of the statistical returns of India, extending over 30 years, it has always been the case that the official forecasts have been below those of the commercial experts engaged in the same task and the commercial experts in my experience—whether from greater courage or a more elastic conscience, I do not know—have generally proved to be right.

Mr. MACKAY: May I say that what has struck us most in working at this question is the marked absence from nearly all the returns of accurate estimates or accurate statements of increment. I think one of the first things we have to take in hand is the setting aside of large plots of forest and careful measurement over a fixed period of years so that we may arrive at what may be fairly regarded as nett annual increment, in order that in future when returns are sent of timber to Great Britain or the contemplated Bureau of Information they shall be fairly accurate, and not merely haphazard, as they appear to be at present.

Mr. C. E. LEGAT (Chief Conservator of Forests, South Africa): The position in South Africa is that the Union can meet its own requirements as far as hardwood is concerned to a large extent, but will probably have nothing available for export or only a very small amount of some special kinds of wood.

South Africa is in the position of requiring woods from other countries. At present it imports something like 20,000,000 cubic feet, almost entirely soft wood timber. As the country develops industrially, which it promises to do quickly, it is probable that this import will rapidly increase and South Africa, which depends at present mostly on Sweden and Norway for its supplies, possibly might be able to trade with other parts of the Empire in preference and get its timber supplies, say, from Canada, where I understand there is a surplus.

Our object in South Africa—the whole underlying point in our forest policy—is to endeavour, to some extent, to meet this shortage of softwood timber by making extensive plantations of suitable conifers.

Mr. A. RODGER (Indian Forest Service) : It appears to be very necessary to draw attention to the urgent necessity for a complete industrial survey of our forest property. I know that that is extremely necessary in India, and I fancy that it is equally necessary to make a survey of all the forest resources over the Empire. It is our duty to be able to answer questions regarding what we can supply in the way of timber, grasses, bamboos, oils, lac, resins, drug plants, paper materials, &c., and this cannot be done until we have made a thorough survey of all our resources.

It is obvious also that it cannot be done until we have enough men to carry out the survey, which I think is a great lack in all the Forest Departments. A Forest Officer has to answer a very great variety of questions on the possibilities of supplying forest products, and I may say from long and painful experience of my own that as a Research Officer I was very much handicapped on many occasions by the lack of reliable data. It will hardly be believed what a variety of subjects Forest Officers are supposed to have at their finger tips. One gets inquiries about the most unlikely subjects, and I think it is our duty to be able to give information to the public on all points that they wish to know with regard to the nature and quantities of forest products available. The public desire to be supplied with facts and we cannot supply them with the necessary facts until this industrial survey, not only of timber, but of all the minor products has been properly carried out. We have begun this in India and Burma, but very much more is needed in the way of collection of information. India can certainly export much of her forest produce of all kinds, and I am sure that many of the other parts of the Empire are in a similar position. We shall, I think, in carrying out this survey, hope to have great assistance from the Central Forest Bureau, or Research Institute, when it is established, and I think we can hardly lay too much stress on the urgent necessity for a well-considered plan for collecting this information from every part of the Empire which can export forest-produce, timber and all the other products to other countries.

Mr. A. BÉDARD (Quebec) : As I have already said, in the brief statement which I made at the Guildhall, the total area in Quebec covered with forest vegetation is estimated at 515,625 square miles. If, however, we leave aside the unprofitable or inaccessible forest lands, which for the most part lie in the new Quebec, the area of merchantable timber is figured at 203,000 square miles, of which 192,000 square miles are Crown timber lands, either leased or unleased.

The vast territory recently annexed to Quebec, and better known under the name of New Quebec or Ungava Territory, undoubtedly possesses considerable forest resources as well as great water-power possibilities. It is proposed to make an inventory of that property and to establish in it three forestry posts, one at Hamilton Bay, one at Ungava Bay and one at James Bay connected by wireless telegraphy, from which foresters will go and make an inventory.

We want to be able to adjust the annual lumber and pulpwood output to the possibility of the forest.

A statement which has been carefully prepared for Old Quebec, and which takes in only the merchantable timber and totally disregards the young stock, gives 38,750,000,000 cubic feet, as representing the forest wealth. These figures are made up mostly of coniferous woods. In fact, the stand of merchantable hardwoods is estimated at 4,375,000,000 cubic feet. Thus, an abundant supply of coniferous wood can be depended upon. On all our accessible forest lands the trees, such as spruce, balsam fir, poplar and aspen of four inches in diameter and over which can be converted into pulp and paper, according to Mr. G. C. Piche's recent estimate, would contain 360,000,000 cords, of which, however, but 155,000,000 cords would be really available, under the present conditions.

It has been stated elsewhere that the annual output of private and Crown timber lands amounted to about 240,500,000 cubic feet, and that 55 per cent. of the wood products were shipped to other Provinces and to foreign markets. It is safe to say that, at the present rate of consumption and production, the forest wealth of Quebec can be considered as inexhaustible. On the other hand, there is a marked tendency of late to increase the annual consumption both of lumber and pulp wood. If such is the case, how much timber and pulp wood will the Quebec forests be able to yield without their being impaired? To answer this question, the net annual increment has to be figured out. With such a large and almost unexplored country as ours, it is rather difficult to arrive at any definite statement on such an important question. However, after a careful study of the data gathered over varied sections of the Province, the net annual increment could safely be placed at 395,210,000 cubic feet. It is estimated that per square mile the net annual increment equals 3.200 cubic feet, that is 5 feet per acre, which is a very conservative figure. In calculating the total increment, we have deducted 17,440,000 cubic feet for loss through fires, and 243,750,000 cubic feet, loss through decay, &c. If, from the figures given, as representing the net annual increment, we deduct the annual output, we have a surplus of 145,000,000 cubic feet, a surplus which would justify us in increasing our pulp and lumber industry. We should not, however, indulge in considerable development of the latter before a thorough inventory of our forest resources is made.

Up to the present time lumbering operations have not been conducted fully according to silvicultural methods. They have contributed in some sections to impoverish the forest stands and considerably to lessen their increment. On the other hand it may be stated that the increase in value of the wood goods; the utilisation for pulp-making of such weed trees as white birch, which has quite recently taken place; the use of caterpillar-tractors for hauling unfloatable woods in far-remote sections and the development of railway and road facilities will undoubtedly lead to the more economical use of our timbers and the more careful handling of the forest according to silvicultural principles, the restriction of the output on some areas,

and the artificial regeneration which in some parts, especially on areas proximate to the mills, is being resorted to since the creation of a forest nursery at Berthierville, will tend to increase the net annual increment and to augment the proportion of coniferous woods. The Quebec Government have been aware of the position and have given attention to the development of an adequate fire protection system. They have also carried out a wide campaign, through the press and lectures, for public education on forestry matters, and have enacted special laws to force the timber limit holders to use more conservative methods of exploitation, and to confine settlement and colonisation to areas which have been found fit for agricultural purposes.

THE POSITION IN THE CROWN COLONIES.

Mr. BATTISCOMBE : The figures given in my Report are purely estimate; it is quite impossible to form any accurate figure. With regard to the hard and soft woods, it is extremely difficult to get any information at all. It is possible the softwoods may be only 15 per cent. as regards the composition of the forests, but the softwoods, especially cedar, are very subject to fungoid disease. It would be impossible for me to give figures.

The whole question of export of timber from British East Africa hinges on the special value of the timber, having regard to the cost of the 400-mile railway haul. In any case there would be very little demand for any timber except the mangrove timbers, which I do not think would be exported to Europe and America. Really the whole matter depends on research. For the moment there is a small export of pencil cedar, but it is very small; it may be 5,000 cubic feet, certainly not more.

Mr. N. C. McLEOD (Gold Coast) : The Gold Coast comprises the Colony, Ashanti and the Northern territories, the aggregate area of which is about 80,000 square miles. Of this area about 27,000 square miles consist of the evergreen and mixed deciduous type of forest and the balance of 53,000 is Savannah forest and Savannahs. The system of shifting cultivation has been in vogue from time immemorial and is still practised, but fortunately, owing to the small population of less than a million and a half, and tribal wars in the past, large tracts of forest still exist which were never brought under the axe.

It is impossible to state accurately what area of merchantable forest can be set apart as reserved forest, without unduly interfering with the native system of cultivation, but I have calculated that the area should not be less than 14,000 square miles. This area carries on an average about 5,000 cubic feet of timber per acre, composed of a large number of species, comparatively few of which are at present recognised as useful. For the past 30 years Khayas and Entandrophragmas, known as African mahogany, have been exported to Europe and America, the average for the past 10 years being more than one and one-third

million cubic feet, although in 1913 over 3,000,000 cubic feet were exported.

The average annual home consumption for the past 5 years by the mines, railways and general public, excepting what is used by the natives for domestic purposes, has been about 11,000,000 cubic feet.

It is calculated—and here, possibly, I may be wrong—that the net increment of timber from 14,000 square miles is 425,000,000 cubic feet, or nearly 40 times the present annual consumption. Consumption of timber for domestic use has not been taken into account, as the large area of forests which I have allocated to agriculture, etc., is quite sufficient to meet the wants of the natives indefinitely.

As the whole country belongs to the people, the problem which confronts the Government of the Gold Coast is how to bring into reservation the 14,000 square miles of forest which I think can easily be set apart to be looked after and exploited scientifically.

Some of the Paramount Chiefs have themselves expressed their willingness to pass bye-laws for the conservation and protection of their forests, with the advice of the Conservator, and the Government has promised its full support to the chiefs to compel their people to obey such bye-laws. It is the present policy of the Gold Coast Government to enlist the sympathies of the people and to get their support in matters appertaining to forests, rather than to adopt coercive measures, which would only result in, at least, passive resistance, if not active opposition.

I have already said that there are a large number of species of trees whose usefulness has to be demonstrated, and I am glad to say that the Gold Coast Government has promised an annual grant to a research bureau such as Professor Groom has advocated.

Mr. H. M. THOMPSON (Nigeria) : The figures which I gave are a very rough estimate. We have made actual measurements of the rate of growth in only two small reserves, and it would be a risky thing to base the calculations for the whole country on such small data as that. Excepting the areas that have been exploited in the past for mahogany, the bulk of the forests that have not been cut down by the natives in their shifting method of cultivation are practically inaccessible and untouched; the forests are practically over-matured and little increment is being put on. Taking everything into consideration, I estimate the increment at not more than about six cubic feet per annum per acre. That is as far as mahogany and the trees that are usually in demand for export are concerned. No doubt when other timbers come into demand the situation will be much more favourable, because those timbers, up to the present, have not been touched.

As regards the future supply, I have remarked before that the rate at which the forests are being exterminated in a wholesale manner by the inhabitants for their shifting cultivation is extraordinary, and unless we take active steps there will be very little left within the next decade to reserve.

With the object of helping conservation as much as possible, I have been able to get the Administration to consent to the formation of so-called native reserves, that is, the native administrations themselves are responsible for the protection of certain definite areas, whilst the Government itself is responsible for any technical operations or the control of exploitation. The native Courts themselves pass bye-laws which have to be sanctioned by the Government and cannot be revoked except with the sanction of the Governor in Council. So far, we have got two very good reserves established under these conditions, but how the thing will pan out in the end I am unable to say. There is always danger of the land being given up for farming when the pressure occurs.

The population of Nigeria is very much greater than that of the Gold Coast; it is about $16\frac{1}{4}$ millions, the bulk of which is situated in the North, the open Savannah country.

As regards local requirements, prior to the war large quantities of pitch pine and other woods were imported to Nigeria, but since 1914 we have been obliged to fall back on our own resources, and the Forestry Department has been fighting the Public Works Department and other Government Departments with regard to soft and hard woods for local requirements. That attempt to supply the local requirements of the country has brought to the front certain timbers which were very little known before, timbers which so far as the six years of experience enable us to judge, appear eminently suitable and capable of replacing a great deal of the imported pitch pine and coniferous woods.

As a very rough estimate of what has been destroyed within the last 17 years, I can state the figure of 30,000 square miles.

Mr. L. PALFREMAN (Conservator of Forests, Sierra Leone) : I regret I can only regard the small resources of Sierra Leone in a pessimistic light. The Colony and Protectorate originally, and not so long ago, possessed magnificent forests, containing all or most of the valuable timber species associated with Tropical West Africa. Now, I doubt if 1,000 square miles of high forest remain, and this I think is a liberal estimate. This devastation has been caused by rice farmers. There is no doubt that, given proper facilities, the Forest Department can supply some of the timber used locally which has now to be imported, but there is none for export.

Our exportable asset of most importance is palm oil and kernels, and here again we are faced with the result accruing from the destruction of the forests, as the climate is changing rapidly and year by year becoming drier. I do not mean that up to now the rainfall is less, but in a hilly country like Sierra Leone the ground will not hold the moisture, and many of the palm trees are becoming barren while others have never fruited, and the best soil is being rapidly washed away from the hillsides. Also owing to the removal of large masses of vegetation the relative humidity of the atmosphere is reduced. Erosion is severe,

bush fires are unchecked, and the native is finding he has to clear twice as much land as hitherto to procure the same amount of rice as formerly. So we get a shortening of the rotation, which in some places is down to five years. Secondary growth of this type is useless to the soil, and everything seems to point to what is locally called a "hungry" season every year. I may mention that when hungry the native attacks the unfortunate palm tree, from which he removes the growing point, known as the palm cabbage, thereby effectually destroying it. Many thousands of palm trees have been killed in this manner, and also by tapping for palm wine.

One other resource, which it is hoped will in the future prove to be an asset of value is gum tofat, obtained from *Copaifera Guibortiana*. I understand that this quality of gum is unsurpassed for the purpose of making the best varnishes.

To safeguard the trees, which were being tapped to death, tapping was prohibited for four years and a reserve established. Last year the prohibition was removed, as the trees had, generally speaking, made excellent recoveries; tapping was permitted under licence, and there is no doubt good results will be obtained, though at the time I left Sierra Leone the gum had not been collected.

Our small mangrove swamps are now being worked to supply the railway with fuel and sleepers, and I may mention that natural regeneration is excellent.

Mr. ROGERS (Trinidad): In British Guiana it appears that there are 78,000 square miles of forest. Out of this giving my own opinion; I have not had an opportunity of consulting any authorities there—28,000 square miles should safely be reserved. We have no actual figures regarding increment, but taking the increment on the same basis as was given to us with regard to India (8 cubic feet per acre per annum) and the exports at 400,000 cubic feet there should be a safe balance left over for the improvement of the forest and the maintenance of the supply.

In addition to timber, British Guiana obtains a great deal of its forest revenue from other forest products, principally balata gum which is largely used in this country in industry. The value of this is about £180,000 a year and the industry is worked under Government regulation, which does not allow the trees to be bled to death and seeks to maintain a regular output year by year.

With regard to British Honduras, of the 4,000 square miles of forest about 2,500 are under mahogany, and here also a considerable area—10 to 20 per cent.—might safely be placed in reserve for permanent production of timber. The increment is unknown, but on the Indian figures there would be a surplus of increment over exports, which amount to about 900,000 cubic feet. In addition to mahogany, cedar is also grown and the increment there would perhaps be 200,000 cubic feet, not more than half of which is at present exported. Business in those parts, largely owing to facilities of transport, is largely with the United States

of America and British North America, but a great deal of the mahogany and the greenheart from British Honduras goes to the United Kingdom.

It would be a great advantage to both those colonies if some definite area were set aside, but the position is a financial one. Each colony has to run its own Government on the taxes that it raises in the country, and until, by means of publicity, we can get these Governments to understand that forestry is a paying concern, I fear very little will be done. Perhaps the work of this conference will bring matters more prominently before those Governments and result in good both to them and the Empire generally.

MR. CUBITT: You have pointed out it is necessary in these estimates which we have placed before the Conference to discriminate clearly between hardwoods and softwoods, and therefore at the very outset we are up against the difficulties of terminology. I understand that in Europe and in America softwood means coniferous wood and hardwood anything else. In the Malay Peninsula and, I think, in India, the woods have a different meaning. Hardwood in the Malay Peninsula means something relatively hard and softwood means something relatively soft. Hardwood at the same time connotes a rather high standard of durability, or at any rate a higher standard of durability than softwood. So it is extremely difficult to present an accurate picture of the position.

With regard to the question of accessibility, I may say that the figures which I have given refer only to accessible forests.

I might perhaps say that shortly before I left for England I prepared a detailed paper for the Government showing in detail what our utilisation is, and as far as possible what the increment is. Our position is shortly, as I have already stated, that we have enough for ourselves but nothing to spare for anyone else. I have suggested to the Government of the Federated Malay States the following steps with a view to making the country permanently self-supporting; consumption must as far as possible be restricted; economies must be effected in consumption; and supplies must be both maintained and increased. In considering the matter for the Empire as a whole the same three points must be borne in mind.

MR. D. K. S. GRANT (Tanganyika Territory): There are considerable areas in the Tanganyika territory of valuable and accessible forest, chiefly situated in the high lands, as well as great mangrove swamps on the coast. Evergreen hardwoods form the greater part of these forests but there are also large quantities of softwoods, among which the species *Podocarpus*, (yellow woods) and *Juniperus procera*, the so-called cedar, are prominent. This cedar timber is finding an ever-increasing use for pencil making. Another valuable timber available in large quantity, and not too far from the railways and coast, is *Ocotea Usambarensis*, which promises to form a fair substitute for teak.

I have seen specimens of many other timbers, some of which have been proven locally to be of ornamental and constructional value, and only require a certain amount of research and advertisement to bring them to the fore. The forests of the country should easily be able to supply its own timber wants if the consumer will give up his conservatism and use local woods in place of imported ones. An export trade in hardwood sleepers to South Africa and in cedar timber for pencil manufacture can confidently be expected.

Mr. J. D. SARGENT (Ceylon): I should like to preface my remarks with an apology for the non-submission of the report from Ceylon. I regret very much that this report has not been prepared, the more so because I feel that it should have been prepared. I was myself in Ceylon at the time that we were called upon to furnish the report, but when I say that our work was so heavy as to necessitate the postponement of my leave for three months after 10½ years continuous service, the difficulty of the situation in Ceylon may be better understood. The department is greatly under-staffed at present for the work it has to perform.

There has been a Forest Department in Ceylon for a good many years, but it is in a backward condition, and we have no statistics at all for the preparation of these returns, which was partly the reason why we felt unable to tackle the report.

Ceylon is roughly divided into two parts, the low-lying and dry region to the North and the South, and the hilly country in the centre of Ceylon. In the Northern part of the island we have such species as the valuable satinwood for export, and other hardwoods which are of great value for use in Ceylon itself.

Our main difficulty, perhaps, has been the question of the reservation of our areas. We have an ordinance providing for reservation, but apparently we have not the machinery for putting into effect within a reasonable period the reservation of our forests, that is to say, we have to wait upon the Land Settlement Department of Ceylon before all the areas contained within the forests that we propose for reservation can be settled and declared Crown property.

There are areas in Ceylon which have been proposed for reservation for a considerable number of years and they seem no nearer to reaching settlement and reservation now, because the settlement of the areas is not taken up in large blocks of forest, but is confined to village tauks and private claims, and our schemes can only follow on as the proposed reserves fall within those settlement areas.

We have, roughly speaking, about 1,000 square miles of reserved forest in Ceylon, but some 50 per cent. of that area is climatic reserve and is inaccessible for exploitation. We have about 5,000 square miles of forest proposed for reservation, but it is possible that those reservation proposals have been drawn up in an arbitrary manner, and some of them, from their commercial standpoint, could quite easily be withdrawn.

We have no approximate knowledge of the volume of timber within our forests or its value. That is due mainly to over-exploitation of the forests in the past when there was no attempt at systematic management at all. I believe I am correct in saying that between the years 1850—1860 in the satinwood forests lying to the North of the island, a satinwood tree which is now worth for the purposes of export, anything from 15 rupees to 30 rupees a cubic foot, was sold for one rupee per tree, and during that period the Customs returns for satinwood from one district alone realised 150,000 rupees. Therefore, within that period, in one part of the country, 150,000 satinwood trees, seed bearers for the future, have been removed; and the same thing has happened in other parts where the timber is accessible. There is also the ebony tree of export, which is commonly found in our forests. But in many cases there is hardly an ebony tree of large dimensions within 12 to 15 miles from the sea, which has not been tapped to test the amount of heartwood that it contains; that is, tapped by the timber thieves, who are very active round the coast.

With regard to the shifting cultivation, or *Chena*, as it is known in Ceylon, the results of this are simply appalling. There is no part of Ceylon where the ordinary Crown forests not required for reservation, or the proposed reserves, or in many cases the forests reserved under the ordinance, are not honeycombed with *Chena*. This work of shifting cultivation has, I regret to say, although opposed by the Forestry Department for a considerable number of years, been extended by the Government, owing to the necessities of the time, because recently there has been a very serious food shortage in Ceylon, which depends mainly on India for its rice supplies, and the number of permits granted for *Chena* cultivation has gone up 300 or 400 per cent.

Where shifting cultivation occurs in the Eastern Province, the " illuk " grass comes in shortly after the shifting cultivation is complete. That grass is inflammable, and almost every year large fires take place, they burn with extraordinary violence and every year a fresh fringe of the forest is caught by the fire and more valuable timber is consumed. So that it is not merely the necessity of preventing *Chena* cultivation in dangerous areas which confronts us, but of safeguarding ourselves from the actual results many years later of that form of cultivation.

It is also very difficult to state really what amount of valuable forest land we have in Ceylon, because we are often unable to check the alienation of what is, in many cases, valuable forest land. I may refer to one of the climatic reserves in the moist zone of Ceylon, which I think was reserved in 1891. Of that reserve, which is considered vital for that part of the country, 7,000 acres are, I fear, to be alienated in order to develop the country, *i.e.*, for rubber estates. A new road was surveyed for about 7 miles, and the alienation of this valuable reserve may

shortly be sanctioned with no outlet for the timber which it contains.

Again, a new railway is to be constructed from the northern line at a point called Maho to Batticaloa. It is certainly an extremely important railway and it is intended in the main to tap the 9,000 acres of land which are to be given up for rice cultivation at Minuery. It is obviously necessary that the work of construction should proceed as rapidly as possible but a depth of five miles on either side of the track for the proposed railway has been given up for the extraction of timber for this railway irrespective of what valuable forest it passes through, and further, a large portion of some of the most valuable Crown forests, which has been reserved for many years, is thrown in with that and is not available for management by the Forestry Department. I merely refer to these instances in order to point out the difficulty of arriving at any estimate of the forest resources of Ceylon which are subordinated to other development schemes.

I may say that the Crown forests of Ceylon have no timber in quantities suitable for export, other than those mentioned. In fact we have not enough to keep ourselves going in the country. There is a very large demand for timber by all Government Departments, and especially the Railway Department, which utilises a few—only one or two—of our valuable hardwoods in Ceylon for sleepers for the railway. They require, roughly, from 100,000 to 150,000 sleepers per annum, and during the time that importation from Australia was a matter of comparative ease, little trouble was taken to see whether there were other suitable species in Ceylon for use as railway sleepers. But when importation from Australia was restricted, and we were thrown back on our own resources, we were asked to supply the full quantum of sleepers required by the railway. This we could possibly do for a period of 10 years; after that, the forests would be exhausted. We have resisted this, and we have been able provisionally to limit the supply of native sleepers to 30,000 per annum, but every year the railway asks us for more, and it is a duel between the Railway Department and ourselves, on our part to bring in new species for this service, on theirs to refuse other than the best known hardwoods.

Reforestation is in progress in Ceylon; it is following the track of areas which are given up for firewood supplies, and we have, roughly, 2,500 acres reforested, in the low-country with teak, and in the up-country with Australian gums and acacias. The up-country work is extremely successful and most promising; in the low-country we have been unable to concentrate the work and it is of far too scattered a nature for efficient supervision by the Divisional Officers. It is however of the very greatest importance owing to the dearth of natural regeneration in our forests. In conclusion you will see that there has been a struggle between different parties in Ceylon which has taken up an inordinate amount of time in the Head Office and diverted us from the proper study of forest work.

Mr. W. D. ELLIS (Colonial Office): The vagueness of the information from the Crown Colonies is no fault of the individuals who wrote the reports or made the speeches. The simple fact is, that the facts are not known. To begin with, before you can really form any estimate of the forests of a country, I think you must first of all have a survey and a map of it, and that we have not got in practically any of these Colonies. We are setting about it and doing it gradually.

Another point that I think must have struck you is, that the two Colonies which have the most virgin forest—at any rate, in proportion to their area, if not absolutely—namely, British Guiana and British Honduras—have no Forest Department at all. That, I think, illustrates a general principle that, just as you do not call for a doctor until you are ill, so you do not think anything about your forests until they are beginning to get exhausted. I really hope this Conference will bear fruit in setting those two Colonies to think about their forests before they are exhausted.

Somebody said in connection with the war, that really war was largely a matter of conveying large weights from one place to another; it was a question of transportation. It seems to me that the question of forest utilisation is also largely a question of the conveyance of large weights from one place to another. The war has made this very much more expensive than it was, and the deduction I draw from that is, that we have got to be very careful, in making our estimates of actual available forest produce, as to where the wood is, where the people who want to use it are, and how much it will cost to carry it from one place to another. I remember someone in East Africa saying that the Kenya Forests were worth £36,000,000. That irritated the Administration, because, as there was nobody willing to give anything for the wood, it was not really worth anything. They would have been glad not merely of £36,000,000, but of £36,000 at that time. So when we get out statistics we want to have details of the distance from the markets and the means of conveyance.

May I refer also to the difficulty of nomenclature. Here, as has been stated, soft wood means coniferous timber, but, properly speaking, soft wood means wood which you can work readily; and in the Tropics we have soft woods which can be applied to the purposes to which conifers are applied here. It is very desirable that that fact should be emphasised and brought out, because there is at the present moment a famine of soft woods. Those Colonies which cannot contribute much, or anything, to the general stock of the Empire and the world by way of export can do a good lot if they will only utilise the stock in their own woods, instead of, as at present they do, trading so much on the general stock, particularly of soft woods. For instance, in the Gold Coast some time ago (before the war) I found it cost us no less than £2,000 to put up a bungalow of three rooms, which was thought suitable accommodation for the Head of the Department, and from

£1,000 to £1,500 for officers of less dignity. I thought it extraordinary, and I went into the matter and found that practically every single thing that went to make those bungalows was imported from England, and yet, in the Gold Coast, they had so much wood that the railway spent a large amount each year in simply removing the timber which fell across the line!

Now, if the Gold Coast with its net increment of timber amounting to 40 times its annual consumption, could utilise its own stock, it would benefit the Empire and its finances. I think, therefore, that it is very important to utilise your stock on the spot, if you can, and save transport.

Major R. E. FISCHER (Cairo): All that has been said by Overseas and Home Delegates has been of the greatest interest to me. The last twenty years out in Egypt I have worked in the dark and single-handed; and before I could openly fight the battle of forestry, I had to go through long years of preparation, experiments and discoveries.

Let me be quite honest with you. There are no forests in Egypt, nor a Forestry Department. I shall further disappoint you by telling you that I am the only forester there, and that nearly all the timber now growing in Egypt comes from my nurseries.

For the last fifteen years I have grappled with this problem of timber growing in Egypt, which, I am proud to say, is now approaching the solution. A glance at the map, and you can define Egypt. A river, in a howling desert: On either side of the stream, a narrow strip of cultivation, varying in width between five and twenty miles. The total area under cultivation is five million acres; the rural population which husbands this land numbers twelve million. Wherever water can be brought on any part of the desert, the finest crops will grow. The rainfall is so small that it is ignored. The fertility of the soil is annually renewed by flood and silt. Five successive crops in two years are reaped from every acre of land which can be irrigated. The return from cotton alone has, last year, exceeded £100 per acre, and land is changing hands at anything between £400 and £700 per acre.

The adjoining land on either side of the valley is a wide expanse of waterless waste, which gets heated to blistering point during the day, and does away with every particle of moisture in the atmosphere. The system of irrigation may be compared to a tap which serves out water at will. In a way, Egypt is a vast forcing house where everything vegetable grows at a tremendous pace. You will readily agree that with such high values of land, and most attractive returns from agriculture, it was no easy proposition to make a fellah take up timber planting. Everything seemed to militate against it. Yet other factors are such that I satisfied myself that, in a country like Egypt, devoid of fuel, devoid of timber, silviculture was not the ordinary "sitting-on-the-fence" game. It must have another aspect here, where coal costs £15 a ton, and a matchboard plank ten shillings.

You speak of long years of waiting, of profits reaped by the second or third generation. This does not apply to Egypt, as you will see presently. Beyond a doubt, unless a quick return could be offered, the issue of my attempt would have been a foregone conclusion. After several years of relentless practical experiments, the description of which I will spare you, I had enough material to begin active propaganda. I had satisfied myself that timber-planting in Egypt only involved an unproductive period of eighteen months. Before I go any further, please remember that my forests are entirely artificial and that they always are a commercial proposition where timber is grown for mixed purposes.

I shall only quote one type before going into generalities. Let us take the Casuarina, which our Australian friends know well. This we sow in beds in October, and, after pricking in pots, we plant it out the following March at the rate of 4,000 trees to the acre. Eighteen months later we cut every other row, and get 20 tons of firewood worth £5 per ton, which sees us through the expenditure of ten years. Two more years, and we fell every other tree, also for fuel. Let me tell you that by then such trees are saplings fully five inches in diameter, one foot from the ground. Our remaining thousand trees stand another six years, and they are then worth £2 each, showing, after making the most liberal allowance for weak and mis-shapen trees, a net return of over £100 per acre per annum. This is one variety out of over two hundred now acclimatised in Egypt.

The same rotation does not apply to hardwoods, used for boat building and water wheels; but there, the selling price of timber is so high that profits are by no means diminished by the longer period involved.

This, I think, has some importance because the Empire has lately acquired a large tract of territory, in many respects identical to Egypt. Some of you gentlemen may be called upon to undertake in Mesopotamia the work of fruitful construction which follows in the wake of the Union Jack. The spade work done in Egypt may be of use to you there. I would also draw your attention to this question of fuel, which is now becoming very acute. What chance has a country, without its own resources in fuel, when it is situated thousands of miles away from coal or oil producing areas, with probably hundreds of miles of rail transport? Even in countries nearer fuel-producing centres, the problem of finding substitutes, which industry can renew at will, has been very seriously considered. Where coal and oil are concerned, we live on capital. I call these two commodities *dead* fuel. Live fuel, in my mind, is represented by water-power and timber, firewood being a bye-product of forestry, in which the stems need not be straight nor the timber mature or close-grained or of a certain girth.

Let me try to suggest an answer to the queries now before us.

Should the initiative in forestry come from the State—and what form should it take? I would answer the first in the

affirmative. The State should not only lead, protect and legislate; but also encourage and efficiently assist. If the State does not foster private enterprise, it falls short of the nobler and wider scope it should set out to reach. May I suggest, however, that the State can never do as well as private enterprise, which can take the risk of making a failure of its enterprise and then disappear unnoticed. The State has to be extremely careful. It cannot afford to make mistakes; and, therefore, cannot afford to launch out in new and perilous directions on a large scale, which is really the only efficient way of testing a problem. Temerity is the privilege of the pioneer who is not answerable to Parliament for his own undoing.

It is my humble opinion that if you remove those powerful weapons the State holds—Budgets, Monopolies, Prohibition—practical private owners would stand a very fair chance of showing results as good as those of the State in many cases. I do not think forestry is an exception—therefore, in my opinion, these powerful weapons should be used by the State to encourage the private planter in every possible way.

In countries where the growth of timber is not rapid, where fuel is inexpensive, where trees are plentiful, silviculture may not seem attractive to the planter. There the State must have a bigger share of the burden; but I do not see why even in those countries, where results are only shown after, say, 50 years, forestry should not be more generally taken up by private enterprise. Why should not one generation get payment for the effort they have produced? Most men, nowadays, recognise the value of an Insurance policy and invest in it. The same principle applies here. Let us assume for the sake of argument that a teak plantation of 60 years is worth £1,200 per acre; surely this plantation has a value, however small, even after its first five years? Spreading the value of the mature timber on an ascending scale over the number of years it covers, there is no reason why the State should not act as a moral banker to the planter. In other words, why should the State not assess the redeemable value of this Insurance policy, at any time after, say, five years? In the same way, the planter who wishes a quicker return could buy a plantation of ten, twenty, thirty or forty years' existence, and continue it.

Before I conclude, let me just say what a boon and a godsend a permanent Imperial Forestry Bureau would be to all those who, in a more or less distant part, work with no criteria to guide them, with no record of previous experience, to enlighten them. Somebody has called the proposed Institution a clearing house. I think the name is excellent. We would all tell the Bureau the tale of our woes, and that of our successes. The brotherhood of planters is one where no jealousy exists, in which there is no room for petty feeling. Away from towns, with Nature as our only mate, we must think widely; and our satisfaction at having discovered something new will be greatly magnified by the feeling that others will profit by it. It is almost futile to state here that, however much a subject may seem to have been exhaustively treated, it will often yield fresh results to continued experiments

based on the data acquired by previous study. The field of experimental study is almost inexhaustible. Not only do new varieties come under the student's eye every year, as new territories are opened up; but the transposition of these and older varieties to zones different to their native habitat give endless ground for study. Again, the moods, habits, and idiosyncrasies of each variety are imperfectly known, and oft-time misleadingly entered. A point on which little has been judiciously written is the best and most advantageous time of cutting. We know, more or less, the maximum number of years for which the better-known trees can be allowed to stand without declining in value; we also know the minimum number of years required to obtain mature timber from such trees. But there is, in my opinion, a point of perhaps greater interest still; the optimum period a tree should stand, to give, all factors considered, the best results it is capable of yielding. This optimum moment widely varies, of course, with climate and conditions; and also, according to the use the timber is intended for. Pines in Corsica and in England grow at a different pace. Again, they are cut at very different ages for building purposes, and for paper-pulp or firewood. All this information will be available in the Central Bureau of Forestry. Markets, outlets, new utilisations, demand—in short, everything of interest to the planter and forester—will converge towards it, and will save both the scholar and the practical man having to go over the ground which has already been covered.

Let me, in conclusion, thank you for having allowed me to be in your midst and to express my views.

THE POSITION IN THE UNITED KINGDOM.

MR. DUCHESNE: The data we have to go upon in the United Kingdom are extremely meagre, and that is responsible for some of the difficulties we have in collecting information relating to supplies in this country.

Here, however, we have enormous markets for the timbers of the Empire, for our bill for imported timber supplies amounted to £73,000,000 sterling this year, and will probably be largely exceeded next year. Out of that the native supplies before the war only represented about 10 per cent. and therefore the imported timber has a controlling influence on our market, and influences all the points relating to the utilisation of that timber. The effect of the war has been that the supplies have been very largely diminished, and although it is difficult to base exact information upon what is still standing in the country, it would be true to say that of England and Wales the soft woods generally have been very largely cut over, but there are still considerable supplies of hard woods and particularly oak. There are also considerable stands of beech and some of the other hard woods. Another hard wood that we have in the country is the elm, which is, of course, largely a hedgerow timber, and that brings me to the point as to how difficult it is to get authentic information as to what the stands are. So much of the timber in England and Wales is grown in small spinneys, hedgerows and also on more or less residential plots. The supplies are extremely distributed,

parcels that are placed on the market are extremely varied, and many varieties are put on the market in one particular parcel so that it is very difficult indeed to grade our timber properly.

The most important thing now is the supply of pit wood, of which our consumption at the outbreak of war was something like 4,500,000 tons per annum.

We have here great difficulties of collection, and very heavy costs of that collection and transport. The cost of marketing, particularly of inferior oak and other timbers, is sometimes so great, when they are a distance from the station, that they are comparatively valueless.

Sir HUGH SHAW STEWART (Scotland) : I would say one word on the question that has just been raised of collecting information. I presume that, as so much of the timber producing land is in private hands, one way would be to circularise the owners for information, and it must be remarked that such timber as there is in Scotland is not all available for the market, because so much is used on the estate themselves. In our wet climate the fencing deteriorates so soon that a great amount of timber is used for fencing and gates, and then there is a certain amount of timber used for sheds for farm buildings; therefore I hope special space will be left in the schedule for each estate to give an estimate of the percentage of its own timber that can never reach the market. One further thing, is the greatly increased local demand for fuel.

Mr. F. R. S. BALFOUR (Scotland) : Perhaps I might say something in regard to the survey which I had to organise on this particular question. Before the Armistice it became a very urgent matter for the Timber Supply Department to get some idea, in Scotland at any rate, of how much timber was actually available which had not been cut. We did not know at all—at least the estimates were, of necessity, extremely rough—as to how much more was to be had. Some time previous to that a rough general survey of all the woodlands of Scotland had been made by officers who had been trained for the purpose rather rapidly, but they had provided a rough survey of the actual woodland area of the whole of Scotland. It had not taken very long, the results were necessarily approximate, but we felt that even after that had been got it was really very little guide to show how much sawable wood was to be had, how much pit wood was to be had, and what other classes, such as hardwoods and sawable sleeper wood there were. So we carried out a special survey in one particular county—Perthshire, which is representative inasmuch as it is largely highland as well as largely lowland. Fifteen to twenty men were carefully trained for that purpose and they started work in September, 1918, and finished about March, 1919. The results of that were, I think, believed to be as accurate as any results to-day. They were told not to spare time; they had to take sample trees and sample areas in every bit of woodland throughout the county; they had to estimate the contents and they sent in their returns, which were all co-ordinated in Edinburgh. Of course, such a survey very soon loses its value because things are constantly changing, and unless one individual were employed to

do nothing else but keep the information up to date, it would be very soon superannuated. It was a very costly process.

I would like to think we could get our results as Sir Hugh has suggested, by writing the proprietors and asking them to send us the particulars of their woodlands, but we tried that in several cases and found the results were unsatisfactory; proprietors had not anybody who could estimate contents and they did not know how to set about doing it themselves, and a great many did not answer at all. So I am afraid the only way to do anything for the whole country would be to do what we did in the case of Perthshire.

Mr. A. C. FORBES (Ireland): I should like to endorse very strongly what Mr. Balfour has said. We attempted the same thing in Ireland on a similar scale. The results were not accurate by any means, but approximately so, and they gave us a very clear idea of what the woods were. The cost worked out at £7,000 for the survey over the whole country and the information we got was roughly the acreage of woods—which we got from the Ordnance sheets—the land cleared, the land under scrub and the land under timber in groups of 25-year age classes. I think if we go on with that work we shall have a fairly sound foundation to build upon. It is work which can be done with little expense, when you have a staff, and it will form a basis for future forestry operations.

As regards the timber supplies of Ireland generally, it is a big subject to deal with. We have 350,000 acres of wood so that we have to look at it through a microscope rather than through a telescope. We found we use 22,000,000 cubic feet a year in the country; of that quantity we import about 15,000,000; the balance is made up of home supplies. We are trying to make the country self-supporting and have no more ambitious scheme than that. But at present the decrease in area is going on at an alarming rate, not only with regard to clearances, which we can gauge with a certain amount of accuracy, but with regard to the areas torn to pieces by improper cuttings. The areas cleared are, roughly, 1,000 to 2,000 acres per annum: many of them are being replanted, but not on the same scale as they have been cut down. I look, in the course of 30 years, to trees being confined to places like Phoenix Park and probably the Botanic Gardens.

CONCLUSION.

Mr. ROBINSON: It was part of my duty, in collaboration with Mr. Acland and Sir John Stirling Maxwell, to draw up in skeleton these forms which you have tried to fill up. We realised from the beginning what an extraordinarily difficult thing it was to try and get any comprehensive view of what is going on in our forests. We drew up a series of tables to the best of our ability, which are logical in form if not in substance. The first one deals with the question of area, the next with ownership, the next with increment, the next utilisation, the next imports and exports, and the final one attempts to set up a balance.

Now, I must say this, that I think it is surprising that the tables have been as well filled up as they have. I never expected to see so much trouble taken in their compilation. We have experienced precisely the same difficulties here in the United Kingdom that you have experienced—that is to say, we do not know enough about our forests to be able to say precisely what the position is. I think that is a situation we ought not to be in. I think also you will all agree with me that until these data can be set down in black and white with reasonable accuracy we ought not to rest content.

With regard to the tables, it was never intended by us that the figures sent in by the different parts of the Empire should simply be put into columns and added up. We were aware that it would give a misleading idea of the whole position simply to tot up the figures—utilisation is so much, increment is so much. We thought, as regards the first meeting, that if the tables achieved the purpose of making us think in concrete terms what the position was, they would have been successful. In subsequent Conferences we can determine how far that idea ought to be expanded.

The situation in any State is not wholly dependent on the absolute nett increment compared with the utilisation. There are a number of factors which come into this. First, there is the utilisation by classes of coniferous and hardwood timbers compared with the nett increment by classes: that is to say, are you using more hard woods or conifers than you are growing? Secondly, on what class of material is the increment being laid? In this connection I would like to read the comment which I made in our own Statement. On page 30 of the United Kingdom Statement the current nett increment is estimated at about 42,000,000 cubic feet, which means the loss of something like 10,000,000 cubic feet compared with the pre-war position. Now, offhand, that looks a fairly satisfactory position, but, looking into the matter a little further, these remarks have been made:

“The loss of increment, therefore, is mainly with the coniferous timber, and is most noticeable in England and Wales, where it is estimated that the increment has fallen from $12\frac{1}{2}$ million cubic feet for 1909-13 to $7\frac{1}{2}$ million cubic feet for 1920. It is precisely in respect of its supply of coniferous timber that the United Kingdom is so badly situated, and the position consequently is extremely unsatisfactory. The differences, moreover, do not represent the full effect of the war fellings, since the best of the woods have been felled, leaving a relatively poor crop of timber in the remaining woods. The pre-war increment was laid on to relatively good trees, and was considerably more valuable, foot for foot, than the post-war increment.”

Then, thirdly, there is the question which the Canadian delegates have brought out, that if the increment is laid on in timber in an inaccessible place it may be of no value whatever.

Fourthly, the figures necessarily are for current increment. Now, in itself, current increment does not give a complete survey of the position. I can imagine a forest estate where something less than the current increment is being utilised year by year and still that estate is not in a position of stability. For instance, if you had an even-aged, semi-matured forest which was putting on, we will say, one million cubic feet per annum and you used half-a-million but did no regeneration, then obviously that state of affairs could not continue. That, I imagine, is the position for the Empire as a whole; we are utilising our mature stands but we are not regenerating sufficiently fast. I throw that out not from precise knowledge but as what seems probably to be the case.

My last point is that if we want—as we do want—to get a complete survey of the position of the Empire in respect of its timber supplies, we have to consider not only the immediate present but also the future, that is to say, what the extension is likely to be in population and in utilisation, and in the need for timber and other forest products. Now these raise up a series of complicated questions and if we are to attempt to answer them at a subsequent conference it is quite clear that some of the best forestry brains in the Empire will have to get together and devise a form and a method of securing that information.

The CHAIRMAN : We have had a particularly interesting account of the Empire's forest resources based on the admittedly insufficient data available at the present time. I am sure that if anyone had any doubt before as to whether we should be satisfied with our information about Empire resources, that doubt has been dispelled by the statements of the overseas foresters whom we have heard to-day. It is clear from the debate that we should learn more about our Empire timber resources, especially about the actual amount of hardwood, softwood and accessible timber we have got throughout the Empire.

The point has also been made—I need only refer to it now—that it is essential in estimating resources, not only to know the position to-day, but also to gauge what it will be in the future. In forestry we have to look a long distance ahead and make provision for the future if we are not to have a timber shortage. I am not going to repeat what I said at the Meeting this morning, but I think that I expressed the views of the Conference that it would be most dangerous at the present time to publish any estimates until we have more accurate data available.

Another point that comes out from to-day's Conference is the importance of realising that we are short of forestry officers throughout the Empire. The status of forestry officers is not always sufficiently recognised to enable them to assert their views and get the forest policy carried out. The question of publicity and educating the people on the importance of forestry is also a matter which has been brought out prominently to-day.

We now pass to the subject of the Development of Empire Resources.

DEVELOPMENT OF IMPERIAL RESOURCES.

Sir MAYSON M. BEETON (Newfoundland) : Very great stress has been laid during these discussions on the utilisation of timber, and I take it that comes under this head that we are now discussing. It has been well pointed out that the forests are grown for use and not for mere ornament. Forests are a national asset only so far as they supply the raw material of industrial development; they may be an obstacle to be overcome in certain stages of a country's development—they often have been in history. Take the case, for instance, of the Pilgrim Fathers. Supposing on landing on the New England shores they had found a gathering of State Foresters who had just laid down hard and fast laws which regulated the cutting of the immense forests which stretched from the Atlantic to the Great Lakes solely in the interests of Forest Conservation, and said, "You can only cut into this and develop this on the lines we lay down." Had that been so, I doubt very much whether the Pilgrim Fathers and their descendants would have reached the line of the Hudson River by this time. The general industrial development of the United States would have been retarded by many, many years. I think this point has to be borne in mind, and I am very glad to hear the strong views that have been expressed in favour of co-ordinating the work of those who utilise and develop the forest wealth with that of those who, on behalf of the State, direct the Regulations under which it is to be used.

To go back for a moment to the resources of Newfoundland. The wood there grows very, very quickly, but being subject to the cold current of the Arctic, which comes down 200 miles east of Newfoundland, there is probably about one month less growth in the year than there is in Canada, with the result that we have not there the hardwoods that interfere with the supply of the more valuable conifers, and the regeneration is rather better for growing spruce and fir, the two trees that we want. The area of Newfoundland is small, it is, roughly, one-fifth larger than Ireland, and of this total area it is estimated that not more than one-quarter is wooded. But, as Nature has supplied us with spruce and fir in large preponderance, the utilisable proportion is very great, and I would like to impress here on all State Foresters in any part of the Empire that if they can find a wood suitable for making paper they will have rendered a very great service, because, unfortunately, the only wood that has been so far discovered suitable for making paper is this same coniferous softwood which we use in such vast quantities for building purposes, and if the drain on that—which has now been so vastly increased—could be transferred to the Topics in some way it would be of great assistance to our Imperial Timber Resources.

In reply to criticism of the long period of years for which leases have been granted to pulp and paper-making Corporations, I must point out that without the security of a long lease you could never induce capital to go into such enterprises. The utilisation of

wood for making paper is, so far as I know, far the most valuable for the locality which grows the timber that has hitherto been discovered; it is an entirely different proposition from cutting down trees to ship to other countries for purely lumber purposes; it affords a very much larger source of employment—I suppose you could multiply by five, at least, the men employed on a given quantity of timber in making paper as compared with the men employed in a saw-mill; and above all it establishes a permanent industry in any given locality, giving permanent employment to a settler population.

Also it must not be forgotten that a vast capital is required and a long time has to elapse before you can see any return for your money on investments in paper and pulp mills and this naturally makes the paper mill proprietor a friend of the forester. The saw-mill man and lumber-mill man, runs into a country, “picks the eyes out,” puts up his saw-mill, dismantles it and runs on to the next location, and so on. That is how the huge forest of white pine that reached half across the American Continent has been largely destroyed without hope of regeneration. The man who runs a paper mill on the other hand, who has to find capital amounting to £40 per ton for every ton of paper he produces, has to make sure that he has as nearly as possible a perpetual source of supply before he is going to invest his money. In that way, he is a friend of the forester and he will be ready to accept and give employment and encouragement to the very best men that Montreal or MacGill Universities can send out. Thus there will be a friendly feeling and co-operation, such as Mr. Grainger described as existing already in British Columbia, between those who frame the Regulations and carry out the Regulations of the Government, and those, on the other hand, who exploit and use the timber.

As regards the type of forester who is to be sent out under these proposed schools, I would suggest, if the Forestry Commissioners can create a Forestry School here which will engender the same confidence in the officers it trains as exists in regard to agriculture in the experts sent out from Kew, then it will have achieved a very great aim.

I will conclude by expressing the hope that we may see universally this linking together and friendly feeling between all parties interested in forestry and forestry industries. Mr. Grainger the other day said that there has been at times some latent hostility between the officers of the State who control and carry out the Forest Regulations, and those who utilise and operate the forests. We do not want that, and as our Chairman has already been given a suggestion for a motto “*Ligna non verba*,” I suggest he should use, as supporters to the Coat of Arms of the Forest Commissioners, a Lumberman with his saw and axe clasping hands with the brass-hatted Official with the wand of office.

MR. GRAINGER: I want to respond to the spirit which Sir Mayson Beeton has shewn. I think if we go into this thing shoulder to shoulder with the Industries we can get a long way

further. I notice that in my own country the increasing extent to which support for Forestry is coming from the Industries, not only from pulp companies, but from timbermen and loggers also. It is astonishing how many handicaps there are at present in doing timber business throughout the world. I know our Trade Department is constantly coming across the most astounding things. You would not believe the explanation of many business men as to why trade in some particular line is not done. It is a forester's business to find out what it is that is handicapping business and try to overcome it. That forces the forester to extend his knowledge, and to be aware of such matters as discrimination in shipping, which hinders trade, tariff matters, damage done to trade by bad shipments and so on.

We want, in fact, to know when trade is being stopped by bad work, and when there is a Forest Service in the country that ships the stuff, and a Forest Service in the country that gets it, it seems to me those two services can do a lot in the way of cutting out bad trade and helping the good. We want those Services to establish an easy fluidity of trade between the different parts of the Empire.

Mr. MACKAY: On that subject, I shall have to touch in the first few sentences on certain things that have happened in connection with the export trade of Australia in the past. Some years ago a considerable shipment of hardwood was sent from Australia to a country in the East for a private railway company for use as railway sleepers. The timber was sent under one name; it should have been a very durable wood with a life of 18 to 20 years if it had been true to name; the private contractor in this case got a sound price, the sleepers were laid down but they lasted on the track for a period of 8 to 10 years only, and orders to that State were not repeated.

In the case of a railway company in the Argentine Republic, the Chief Engineer of the Company assured me that the ties (or sleepers) in that country came from a State which has several timbers almost indistinguishable in grain and general appearance—there is only one method by which they can be distinguished, but I cannot mention it because it would fix the identity of the State. These sleepers lasted from three to four years in the road bed. I need hardly say that in both those cases both the Colony concerned and the suppliers got a very bad name and there was no repetition of orders. Both had ample supplies of timber, the Contractors lost trade through what we may call sheer dishonesty. This occurred many years ago and since then all exporting States regulate, classify and brand their timbers for export. I think there can be no other means of fixing the identity of the timber, especially in the United Kingdom and the United States, which takes some of our durable hardwoods for harbour work, unless the State takes full control of the timber export trade, has a system of branding and stamping at the port of export, and sees that the shipment is accompanied by certificates of both quality and identity.

Australia, as you are probably aware, has a very limited supply of coniferous timber; the State which has the chief supply is Queensland, and it is practically restricted to *Araucaria Cunninghamii*, commonly known as Hoop Pine. Owing to the demands here during the War for red and white Baltic deals, we in the Southern States, Victoria and New South Wales, have had to depend on supplies of native Hoop Pine timber for ordinary building construction. Therefore, the supplies have been much depleted. The timbers which Australia will have in future to offer for export will be confined to durable hardwoods such as Jarrah and Karri in Western Australia, and to stringy bark in Eastern Australia and Tasmania. We have to face this fact, that all our State Railways are controlled and managed under the direct purview of the State, Commissioners have been appointed to administer them and their requirements in the matter of bridge beams, sleepers, jetty and port timbers are very large, so that I cannot see any likelihood of export from any of the States except those I have mentioned. Even in our internal consumption we are confronted with the fact that timbers are not supplied true to name, hence works which would last from 30 to 40 years frequently last only one-fourth that time. Again, in building construction, timbers are not always supplied true to name, and one reason for that is, there has been much confusion of vernacular terms under which they are known to timber men and bushmen, and timbers are never put on the market or supplied under a botanical or specific name.

Mr. PERREE : India is not wholly dependent upon its timbers for its forest revenue. There are other very important sources, such as lac, which is practically an Indian monopoly at the present time. It is not exactly a State monopoly for the greater part of the lac is produced from small Indian States who do not conserve their forests. We have recently had an enquiry into lac production and it is hoped that at all events the State forests will be able to develop the supply very largely. We had in October last a visit from a gentleman, an American who is interested in the lac trade, and I gathered from his conversation that he would be prepared to take any quantity up to two or three times the present production for his own purposes. There we have an important industry developed out of a minor product and there are many others.

India also is now developing very largely in the production of tan extracts. Hitherto, apparently, the demand has been met from other sources, but at the present moment a great deal of capital has been sunk in producing extracts in the most concentrated form suitable for export to foreign countries.

In resin we have now reached a stage at which we can produce a great deal more than India can absorb. We are in touch with South Africa and Australia in the hope that both in paper and soap manufacture they will be able to absorb the excess of our present output. Of turpentine also we have a surplus, and we are exporting in small quantities to China, but we have not been able as yet to tackle any other market. It is not necessary to refer to

the teak trade, of which India has a monopoly. You have seen too at the Timber Exhibition that there are tremendous possibilities in hitherto little known timbers for special work such as cabinet making.

The outcome of all this is that we have come to a very important point in our development, and it is impossible to terminate this discussion without alluding to this very important Bureau that we are contemplating. Without such a Bureau we should not be able to scatter the information among all the component parts of the Empire, and so bring the producer and the consumer together. I think, therefore, that it should be part of the constructive policy of this Conference to get this Bureau started for without it we shall not make any marked progress in our Forestry development.

The Bureau will doubtless cost money, and may I suggest a means of getting funds for that purpose; that is, by means of an export tax or cess which need not be high:—but a small tax on every ton of timber or forest product exported from a country might very well be collected to go towards the maintenance of the Imperial Bureau.

Mr. CUBITT: I feel somewhat nervous of speaking on a subject which I nevertheless consider of considerable importance—the relation of the salaries and the status of forest officials to forest development.

Personally I have no axe to grind; I am still a member of the Indian Forest Department and if I do not like the conditions in the Colonies I can go back to India. I am speaking too, not for those forest officers who are already in the service of the Government, but for the future.

Now, generally speaking, in an Oriental country, where everybody's cook knows his master's salary, salary and status are the same, and the small salaried official is not in the same position as those with the larger salaries. Incidentally, the small salaried official does not get such a good cook.

There have been Commissions in all parts of the Empire on the subject of these salaries. To the Commission which sat in the Federated Malay States I said that it appeared to me a question of what you wanted. If you wanted bad men you could pay them bad salaries; if you wanted good men you must pay them good salaries. The Commission noted that opinion of mine and they fixed the salaries, but the difficulty was they did not say whether those salaries were for good men or for bad men and so it is impossible to criticise.

I think every Forest Officer will agree that there is no essential difference between forest problems in the Colonies and in India. The Colonies, like India, must have the best, and the opportunities of the Forest Officers of the Colonies must, at least, equal the opportunities of the Forest Officers recruited for India. If the opportunities are not equal, then it seems to follow that you start within the Empire a most vicious form of competition. No one would, I am quite sure, allow competition, say, between the Admiralty and the War Office for timber—(A voice: "There is")

—perhaps there is; I do not know. But it seems to me equally bad that there should be competition within the Empire for Forest Officers. It will, of course, immediately mean that the Colonies will get inferior material. But what is infinitely worse, competition may mean a separate system of education and a separate system of recruitment, which would add enormously to the difficulties. It further seems to me that unless every part of the Empire gets the best men those parts which get the inferior material will cut no ice in the Forestry world and their opinions will be thought nothing of either in contributing to this Bureau of Information which is to be established, or in helping in research or education.

There is one other remark I have to make and that refers to education. India has led the way in forest matters and I think that all the Colonies—of course, I exclude the Dominions from these remarks I am making—will agree they cannot stand alone in education or any other matter of real importance. I therefore do appeal to India on behalf of the Colonies not to start a separate education for the Indian recruits in India. I think it is most important that the education for the whole Empire outside the Dominions should be in one central institution, and that if it is not development in Forestry will be much hampered.

CONCLUSION.

The Chairman, in summing up the discussion, dealt with the importance of co-operation between the various parts of the Empire. He also mentioned the importance of close co-operation between the Imperial Forestry Bureau, as a clearing-house for information on Sylvicultural questions and the Imperial Institute, and the Imperial College of Science and Technology, and the Department of Overseas Trade.

FIFTH DAY.—Tuesday, 20th July, 1920.

At the commencement of the Session the Chairman sketched out a provisional time-table for the day's discussion which was approved.

SUPPLY OF SEEDS.

In a brief discussion, in which the Chairman and Messrs. Finlayson, Mackay and Robinson took part, it was agreed that a Committee meet at the Offices of the Forestry Commission, 22, Grosvenor Gardens, after the formal business of the Conference was concluded to discuss arrangements for seed supply.

IMPERIAL FORESTRY BUREAU.

Mr. Robinson presented the report of the Committee appointed to prepare a scheme for an Imperial Forestry Bureau. The discussion, by agreement was limited to questions of principle. The

following took part in the discussion : Members of the Committee (who explained that the report represented the unanimous opinion of the members), Sir Claude Hill, Messrs. Acland, Finlayson, Professors Groom and Henry and Mr. Duchesne.

A BRITISH EMPIRE FORESTRY SOCIETY.

Arising out of the general discussion on the Imperial Forestry Bureau the Chairman, with the concurrence of the delegates, directed attention to a proposal which had reached him to establish an Imperial Forestry Association.

MR. DUCHESNE : The Imperial Forestry Society would have reference particularly to propaganda work. Propaganda is best done by an entirely non-official body, and should be properly organised throughout the Empire so as to carry out the particular points on which we want to educate everyone.

The three particular points I would call attention to are : (1) that we should get everyone, and particularly Members of Parliament and the Legislature to appreciate the importance of wood as a raw material ; (2) that we should try to educate them on the important question of linking up timber supplies and afforestation ; (3) that we should try and drive into all sections of the community the importance of forest conservation throughout the Empire, so that they should be able to build up proper forest services throughout the Empire for conservation, for fire patrols and in other ways.

As regards education, we want in particular to educate consumers in the trade in the importance of encouraging forestry and the conservation of the forests ; and to educate architects and those who buy timber, in addition to lumber men, so that they may properly appreciate all the different points which we have been discussing at this Conference.

In forming an Imperial Forestry Society, we had in mind that you should link up the various forestry bodies throughout the Empire and, of course, work mainly through those Forestry bodies. In this connection we wish above all to encourage the Canadian Forestry Association with its 12,000 members, which has done so much good throughout Canada in getting the various sections to take an interest in the forests.

If we could get this to work our propaganda would be properly organised, and I believe that the very useful discussion of other matters which has been gone into at this Conference will be rather thrown away unless we take full opportunity for so organising propaganda that we can disseminate through the Empire the various points which we have discussed and which have been so interesting to all of us here.

MR. GRAINGER : I feel that in these Committees' Reports are some extremely valuable proposals, and the question to me is, how you are going to put over these proposals unless you set up some sort of organisation that will start the work. In the United States, I think there would be very little in the way of a Forest

Service, or Forestry, if it had not been for the very strenuous and sustained campaign launched by Mr. Gifford Pinchot and others over a considerable period of years. One of the objects of this Conference must be that we should leave behind us a live organisation to see that what we have done here is brought to fruition, and that the general battle for Forestry in the Empire is won. It seems to me at this moment we are closer together than we ever shall be. Before we separate, we ought to appoint some small Committee that will stay on the spot and work out the details of a Forestry Scheme for the Empire, an Association which will bring in not only Foresters but Forest Industries, so that all of us will be able to do the best we can for forest resources. If we can so arrange matters that that Committee can here and immediately get to work and draft a Scheme, then before the matter is cold the Scheme will probably be in our hands and we can go away with the feeling that we are to co-operate and do some useful work. It is an essential part of Forestry publicity, it seems to me, that whatever work is attempted should be of the very highest class. We should not let this opportunity go by without getting the thing started on a working basis.

Mr. ACLAND: However good the Bureau may be we have to realise that as an organisation supported by Governments it will have to keep on fairly official lines and will not be able to roam at large over the whole field of subjects interesting to Foresters in the way that a less official organisation could do. There are many things which a non-official body can do which an official body cannot do, and I feel very strongly that it would be a great pity if this Conference separated without, at any rate, working out a skeleton basis for some wider organisation which will be a bond between people interested in Forestry all over the world.

Several of us have been talking over this idea in Scotland (namely, Sir Claude Hill, Dr. Borthwick, Mr. Grainger, Mr. Battiscombe, Mr. Leavitt, Sir Mayson Beeton and Mr. Cubitt), but there is one other name I should like to mention, and I am sure that all who are interested in this subject will agree that he would help us very greatly if he joined, and that is Sir John Stirling Maxwell, who is an Associate Delegate to this Conference, but who has, unfortunately, been prevented by ill-health from taking part in our discussion. If he could take charge at this end, it would be a great help.

We have worked very much on the same lines as Mr. Duchesne and his friends have been working. We first of all thought that it was very important in order to get a good start that this organisation should, in some way, be an Association of Forestry Associations of the Empire, that Associations as such should join. Many of them would be willing to join and pay a reasonable subscription on behalf of the whole of their membership; others would join on behalf, it might be, of such of their members as wanted to be considered as individual members. There should probably also be provision for other persons joining as individuals, and not through Societies, and one of the ideas that went through our minds was that all the persons professionally employed in Forest Services, or probably on timber conversion, or timber

utilisation services, should be allowed to come in at a lower rate of subscription.

It would be the hope of those who were talking it over that many people, as soon as they had finished their Forestry training and become fully qualified Forestry Officers, would look to this Association as supplying a long-felt want which would help them to keep in touch with the people interested in Forestry throughout the Empire.

Then we agreed that one of the things that the Empire Forestry Association could do, which would be undoubtedly useful, would be to publish, it might be quarterly, a journal, which would be primarily a resumé or condensation of the best matter in all the Forestry Journals or publications issued by the existing Forestry Associations of the Empire. It would also keep a record of people's changes of address, and a list of correspondents, with their addresses, all over the Empire, so that any Forester travelling over the Empire would know where he could find some one who would welcome him as a brother Forester.

The question of publicity and propaganda is the most important, no doubt, and also presents the most difficulty, because to some of us who were talking on the subject it appeared that propaganda must in its essence be local. It is extraordinarily difficult, some of us felt, to direct propaganda from one centre, and, obviously, if you have an officer, or officers, in charge of propaganda or publicity work travelling all round the Empire, studying local conditions and starting local agencies, you will run into a very heavy item of expenditure for salaries and expenses. But, of course, all that is open; it is only the feeling *in* the minds of some of us that although propaganda all over the Empire—and I agree in this country perhaps more than any other—is very necessary, it is very difficult to direct that from a common centre in any effective way.

Professor TROUP: We have had a Forestry Association in India for a good many years now, and I should like to point out, before we go further in a general association, the principal fault of the Indian Association. I think they originally set out with the idea of making it, not only a form of Trade Union to look after the interests of Forest Officers, but also to advance professional knowledge. Unfortunately the latter aim has never matured, and so far the Forest Association of India has been very largely an organisation occupied with drafting memorials, pointing out the bad prospects of the Indian Forester, and, in fact, holding a pistol at the head of the Government. Now, although, of course, we must look after our own interests, and a general organisation ought to have that as one of its aims, still I think it is even more important that it should form a bond of brotherhood among Foresters, and should, above all, aim at advancing our professional status and knowledge of Forestry.

The proposal was put to me some little time ago that we should have some such organisation and I gathered that the idea was to make it a very close preserve of the trained Forester—whatever that may mean. I was inclined to turn the idea down because I

thought that would be quite unworkable, it would exclude men who, although they do not actually possess degrees or diplomas of a recognised Training School, are none the less extremely keen on forestry and are very largely interested in forestry, both as owners of forests and as agents, or persons who deal with forests and forest products. I understand now that the idea is not to make it a close preserve, but to make it sufficiently wide to embrace anyone who is directly or indirectly interested in forestry, and as such I think that the scheme is to be supported as strongly as possible.

The CHAIRMAN (in reply to a question) : The idea I think was very clearly brought out by Mr. Duchesne and Mr. Acland, that, in the first place, this should be an unofficial Union, comprising bodies of foresters, and individual foresters who wish to join, and technical foresters who wish to join through their Executive in the various parts of the country, to undertake primarily, as Mr. Acland pointed out, their local propagandist work influencing newspapers, getting the facts before Members of Parliament, educating the public, with a view eventually of having forestry and the importance of timber recognised in the area in which they are interested. A second line of work, which is entirely distinct, and which will be a wider interest than local propaganda, will be the work done by a Journal if and when established. This Journal, as has been pointed out, will take most interesting matters of what you might call general Empire interest from the Forestry Journals, and sometimes select whole articles, at other times give summaries. That work will be of imperial interest and that Journal, if it performs its work, will not only be read in Canada, or the Malay States, but will contain matter relating to Empire markets, summaries by leading people interested in Empire trade, not from the point of view merely of the consumer in Great Britain, but from the point of view of the consumer in all parts of the world. Propaganda will of its nature be of necessity local while the Journal will be, if I may use the term, universal throughout the Empire.

Sir CLAUDE HILL : I know in the minds of the members of the informal gathering which considered this in Scotland the other day, there was no intention whatever to limit the membership at all; provided the members pay their subscriptions punctually they will be welcomed, from whatever class of society they happen to come, and it is on that basis that we hope there will be a very wide distribution of information and a wide excitement of interest in forest matters which has hitherto been so lacking.

Mr. ROBSON BLACK (Secretary of the Canadian Forestry Association, Canada) : Our case in Canada is simply this, that forestry propaganda is almost as necessary to the promotion of forestry as trees are themselves. Progressive legislation, particularly as regards fires and other matters, could not have gone forward had it not been for propagandist work, going out and winning the good opinion of the man in the street.

Mr. Acland mentioned a minute ago the desirability of asking the views of Sir John Stirling-Maxwell. Sir John happened to

mention to me yesterday, at Glasgow, that he did not see any hope at all of propagandist work being centralised in any way; and that it must be left to the various Dominions and localities. But he did say where good work could be done along those various lines which have been brought out this morning.

Now, as far as we are concerned, our Organisation is a union of the Governments and the Pulp and Paper and Timber Industries and the mass of the Canadian public. It has a great variety of people in it, from Indian Chieftains to Prime Ministers and the Presidents of big private corporations, and the march forward, insofar as we have made any march forward, has been by a co-operative process. There has been no forestry imposed from on top, and never could be; it has been shoved up from underneath, and no Government in enacting these Forest Laws has attempted to put any legislation through until they were quite sure that there was some substantial body of public opinion behind it.

The Provincial Forester, who may draft the legislation, in almost every case looks to the Forestry Associations and other bodies to develop the line of propagandist work which has particular weight with the public and the members of the Legislature. So propagandist work again and again has run counter to the wishes of the Governments, but that has not had particular weight with Forestry Associations; we have gone into it feeling we were not welcomed, and, with the help of the various Pulp and Paper Companies, we have got through a particular piece of legislation by making representations to Legislatures and Governments to help the thing through—Ministers again and again have admitted that there would have been no hope for various pieces of legislation had it not been that some unattached Organisation came out and tapped public opinion. This has been done not only through the printed journals, but through having a membership that runs into more than 12,000, groups of members living in practically every town and city and village in the Dominion, so that we have really local agencies to which we can appeal in case a piece of legislation or matter of local importance is going through in a particular Province. These men rally round the Forestry Association and the policy it advocates, and by being on the ground and having political weight, usually succeed in pushing it through the Legislature. We do not rely on newspapers, as we used to. It seems a world-wide thing that newspapers are putting up the bar against free publicity, and even in forestry propaganda they ask that it be put on a paid basis.

We use lecturers in the Quebec Province, sending them into the backwoods. We have railway cars going across the bare prairies fitted up as motion-picture cars with a lecturer or demonstrator aboard, and getting the farmers in those districts who require trees for the prevention of soil drifting particularly—we are not attempting to produce timbers—to come aboard and see these methods, how a shelter belt is established. The idea is to show them the cost and procedure in regard to shelter belt planting, and the necessity of asking the Government to establish

nurseries. That is not a matter of forestry, it is a matter of tree planting. Then other Lecturers are sent out to the various districts to explain to the public in the most elementary way what the forest means in the way of employment and wages. They do not talk forestry to them, they talk the most elementary forest economics, but, taken as a whole, all the effect of this continued year after year, is that a public sentiment is being built up from the outside of the circle, pressing on the hub, as it were, all the time, so that when we go to the Government in the future—say, two or three years from now—we feel sure they have a body of public sentiment on which they can securely rely.

RESEARCH.

The following extracts are given from the discussion upon a report presented by Professor Troup from a committee appointed to prepare a draft scheme for the organisation of research work :—

Dr. BORTHWICK : Research is really the pursuit of new information, finding out new facts, and that presupposes and postulates a Research Institution, and not only a Research Institution of the ordinary type but one of the finest that can be produced, which we all want to see, really the most reliable and most up-to-date institution that can be brought into existence. Now that may take some little time to build up, but a lot will depend upon the beginning that is made, and it appears that a central institution would be the right thing.

At the same time, there exist already various University Colleges and Technical Institutions which are well equipped with laboratories and apparatus of various kinds that are quite capable of undertaking the research in one or other branch of forestry investigation. I think full use should be made of those already existing institutions, not only from the point of view of economy but with a view of keeping the interest general and stimulating an endeavour, not of competition, but for the one to keep up to the same standard as the other.

The object in having a central institution is to collect and co-ordinate the work which would be done by those other, if I may say, isolated research centres. The Research Board would have as a very important function the propounding of problems and of saying to the Research Institute or the Research Institutions, " We want a certain problem or problems investigated; which would be the best centre at which to do that? " and to relegate the special problems to the centres most suited to carry out the investigation.

Then these would be collected and collated in the central institution and, to avoid overlapping and duplication of work it would be essential that, while investigation was proceeding in any centre, the progress towards results should be made known, because very often in carrying out a piece of research certain facts emerge which are of no immediate value to the researcher in his present problem, but which might be of great value to somebody else engaged on a collateral research.

Then I agree that there are two main branches of research—that is research into the factors of production and research concerning the use which can be made of the final forest products, and I think the British Empire is in an infinitely better position than any other unit that exists as regards the amount of raw materials and the problems that could be investigated. There are not only the timber products, but such an infinite variety of by-products which might easily be turned to very considerable commercial value.

The number of by-products that no doubt could be got from the great variety of material which will be at the disposal of this Research Institute is a thing that ought to command every support for such an establishment, and although the costs may be great they are fractional in comparison with the value of the results which may be achieved. I think on those lines that we are on very safe ground in proceeding on the lines of the Report.

Mr. ACLAND : I think we ought to disabuse our minds, if any of us have had it in our minds, that the idea of a Research Board and a Research Institute are incompatible. I think they well might be combined, and personally I think they ought to be combined. I take it that the work of a Research Board is generally first to work out a policy for setting the tasks for research and seeing that they are carried out in an organised and co-ordinated way by different institutions which may be engaged on research, and secondly, to provide the sinews of war to finance the policy which they have worked out, but I know that in some cases they have found that there were not any existent institutions at which research which they desired to have carried out could be carried out, and they have had to start institutions of their own.

At other times they have found that Universities or Technical Institutes or something of that kind were sufficiently equipped to do the work, but it would not be, I am sure, beyond the ordinary purview of a Research Board itself to found a Central Research Institute for doing the work. Therefore, I think the idea of an Institute is clearly implicit in the idea of a Board.

But what would be, perhaps, likely to happen with regard to forestry is that the Institute should, perhaps, be partly financed by the Board, which would be primarily looking after research with regard to timber and timber products, and partly financed by such bodies as the Forestry Commission of the United Kingdom, who are primarily interested in the problems of growing timber, and an Institute financed partly in those two ways would, of course, inevitably do what the Sub-Committee lay great stress upon, namely, see that there is proper co-ordination and connection between research on the production of timber and research on the utilisation of timber. I can imagine such a Research Institute therefore, as its primary function, directing, guiding and co-ordinating the results of Forestry research in production; secondly, seeing that there is a broad and constant relation between the problems of production and the problems

of consumption and utilisation ; and thirdly, if existing institutions are not found to be sufficient for that purpose, actually carrying out research by founding Institutions for the purpose.

SIR CLAUDE HILL : I may perhaps illustrate what I understand to be Mr. Acland's contention in regard to the Board and the Institute by what has happened in India in the case of the establishment of a body known as the Board of Scientific Advice. That Board was constituted in order, if possible, to co-ordinate the various scientific investigations in different Departments, Medical, Sanitary, Chemical, and so on, which were going on in India, but in point of fact its aloofness from any Institute of its own where it could direct matters and cause matters to be investigated which called for investigation, has resulted very largely in rendering its usefulness nugatory. It meets now at long intervals and practically passes on matter for publication which is sent to it, and its usefulness is practically limited to that ; it has no directing or valuable function as an instigator, or a stimulant to research, and I think the circumstances would have been very different had that Board of Scientific Advice, which was constituted like so many other things with the best possible intentions, been framed on a more concrete model with an organisation enabling it to get carried into effect the research which it advocated.

MAJOR R. E. FISCHER (Cairo) : The system of Education and Research to be adopted, on which the Conference has been called upon to express an opinion, is one of such momentous importance that it is desirable that a decision should only be arrived at after mature consideration. Like slow-growing trees, education only begins to show results, good or bad, after two score years, and a flaw in the methods must have serious consequences, the full weight of which is borne by generations to come.

It has been suggested that Research should be closely coupled with Education in Forestry. In my opinion, this is undesirable and dangerous. If I were to define education in the case of teaching in School or University, I would describe it as "a period of preparation of the brain to receive and assimilate learning." A student, when he has qualified and obtained his degree, has reached that point and no further. He is then capable of learning and discriminating between right and wrong in Science ; but his real education only begins from then onwards. He will gradually understand the meaning of what he has learned by applying it, untutored, to its environment. In other words, the foundation he possesses is ready to receive the building for which it was meant. According to individual merits and opportunities, the building will be a noble monument, a landmark in the history of science, or a modest but useful rest-house on the long road that has no end. Often it will be the sorry site of unfinished walls, dismal and tumbling, which afford neither warmth nor shelter to the generations which follow.

Having thus defined my conception of education, may I revert to its preliminary stage, the period of School or University teaching. In the case of Forestry, this is short, terribly short. It

barely gives the future forester enough science to render his grey matter accessible to real and wider learning.

Do I understand that we are going to further handicap him by imposing on him, at the same time, the assimilation of commonplace axioms and the discussion of these axioms and their appliance to wider and more specialised study? How are we to keep in synchronism two studies the progress of which is so different in pace?

Teaching has to be rapid. Research should be very deliberate. We all know that volume upon volume has been written as the result of Research in every branch of Science. May I assert here that many of such volumes, though their value may have seemed enormous when they came out, have since been discarded by scholars and teachers alike as useless, inaccurate and misleading? This is due to the fact that with few exceptions, the scientist, however professionally conscientious he may be, rarely escapes the bias which his own opinion exerts on his work. In a smaller sphere, this applies to all men who impart the fruit of their research to others by teaching. Research requires long years of test to prove its value. It is extremely difficult for a scientist's contemporaries to judge his work. Though a certain amount of data collected may be known to others, this knowledge is disseminated and cannot be brought together for many years. When a publication appears on any particular subject of research, it focusses criticism or approval, and, by a slow process of cross-examination, which sometimes lasts centuries, it stands or falls according to its merits. We may, therefore, call research, in its genital stage, an undigested and dangerous knowledge. In other words, the fruit of research is "a strong wine," which should be administered very cautiously and only when it has matured, to the plastic mind of the student. I can find no better simile than comparing the suggested system of parallel teaching to an attempt at teaching a boy the alphabet and philosophy in the same form.

Again, the focus is different. Research is done, figuratively speaking, through a microscope. Education requires the special astigmatism which takes in a landscape at one glance. Even if we discriminate between local research and compilation of data, a very different stomach, if I may use this figure of speech, is required to digest these two very different foods—Education and Research.

Intelligent, efficient, useful research must be based on a complete, basic scientific knowledge, which the student only acquires when he has finished his studies.

Again, the true value of research lies in the diversity of its sources of observation, the different aspects it conveys to each individual. In University research, the teacher alone possesses the necessary equipment to be able to draw any conclusions, right or wrong. What is the use, I ask, of stereotyping these conclusions, which *may* be wrong, let us remember, into the brains of hundreds or thousands of young students, who accept them implicitly?

Another argument is the specialisation which is essential to efficient research work. This has been partly touched upon by Lord Lovat, who asserted that it was not the intention of the Conference to recommend the suppression of local research. I wish to emphasise this point by saying that local research is the only research, whether it be carried out in the Antipodes or in England. General, or higher research, is the compilation of notes; it is the co-ordination of isolated observation and study.

To sum up, I believe the strong points which militate against the coupling of Research and Education are :

- (a) The danger of immature and undigested observation being distributed :
- (b) The inability of the students to assimilate research work and the risk of interfering with the acceptance of the temporary rules which, at all times, must guide the first steps of those who venture along the steep road of science ;
- (c) The delay and increased difficulty such coupling would involve in teaching :
- (d) The necessity of a much wider field of research than the number of teaching centres would permit :
- (e) The danger of diminishing the value of research by involuntarily substituting the minute specialisation of each subject, a tendency to generalise.

I would, therefore, suggest one Central Research Institute, to co-ordinate and classify the observation and research carried out throughout the Empire. The specialists in charge would, by careful and conscientious compilation, examination and discussion of all notes received, extract the true essence of all study on any one subject ; and this essence could then be distributed without danger.

Let teaching be done in this Institute, by all means ; but only to qualified and experienced foresters, as post-professional teaching. Let us no longer talk of " refresher " courses ; God forbid that we should convey the impression that a qualified forester requires to go over ground previously covered. The courses we suggest would be complementary courses, composed of *new* scientific matter—matter that has only come to light after those foresters who will attend them have left University.

Before leaving the subject, let me vigorously endorse Mr. Grainger's view as to the very great importance I attach to the industrial side of the question, and the imperative necessity, not only to teach the student as thoroughly as possible this aspect of forestry ; but also to keep the research studies in this direction on a par with the teaching. Let scientists who soar in ether not forget that the sanction which counts is that of industry, and practical use. Let us remember that, however laudable the unselfish effort which expects no reward for its toil may be, it does not suffice. It is restricted to a few fortunate. We must have a larger contingent of workers. These workers, scattered all over the Empire, have no private means, budget or salary. They have staked their all, money, brains, energy, sinew and pride on the self-imposed ideal. I compare these obscure workers to the early

Christian martyrs. Though the practical mind may fail to understand the utility of walking into the lion's mouth with eyes lifted to Heaven, the fact nevertheless remains that the Early Christians did more for Christ's doctrine than the Church has achieved in eighteen centuries since. These workers are the obscure millions who built the Empire whose every-day efforts help to maintain it; their muttered "*morituri te salutant, Britannia!*" should not be overlooked. These workers can only find their reward in one way—material results. If we really want to help them, do not let us attempt to do so by speeches and kind words. Let us endeavour to study the industrial, the practical, the material issue. When we have done this, we shall have automatically secured the co-operation of numberless toilers, whose efforts, individually negligible, perhaps, taken collectively, are a power we should not despise.

TRAINING OF FOREST OFFICERS.

LORD CLINTON : I should like to give a brief summary of the more important parts of what we were asked to place before you.

Those of you who followed the debate at the Conference on education last week would, I think, have been impressed, as I was impressed, by the very clearly defined and formulated opinion which was in the minds of most of the Delegates, as to what they required in the way of forestry education. They were all, I think, clearly determined that the present position of education in forestry matters was unsatisfactory, and they wanted a better and a higher standard in the interests of the forestry services. It was also very clearly indicated that this could be best brought about by a central institution, and also they were certainly in favour of combining it in one form or another with a University education.

Now, those views are the views which are very generally held by those of us on the Forestry Commission who have been studying the question for some months, and this Committee has accepted those conditions as the basis of their Report.

But those conditions, important as they are, really beg the question of what we conceive to be the matter upon which controversy is likely to be aroused, and that is the question as to whether this central institute should be an integral part of a University, or whether it should be established outside University control and subject only to the management of a body whose sole educational interest would be in forestry education.

Before we come to actual grips with that important question, there are two points upon which I think I must say a word. The first is, what is the proper age or period of recruitment for this forestry training? Should the student be selected at the outset of his career, at the beginning of his education at the University, or should the selection be made after he has finished his three years' course in science, after he has taken his degree and after he has completed his education at the University as a scientific man? We have decided, as you see, to advise the latter

course, that is that the recruitment should take place after he has taken his degree, and the decision on this point does not actually prejudice the question as to the attachment of the Forestry School to the University, because I think it is clear that if the recruitment takes place after the man has taken his degree he has already got the advantage of his University education, whether his training takes place at a University or at some other place.

The second point is the position of the Government of India towards forestry education. We have enlarged upon that and some may consider we have given it undue prominence. I do not think the Committee would agree that it was an undue prominence, because we believe that the attitude that the Indian Government takes up upon this matter must be a determining factor in our educational policy.

The Government of India have been the pioneer in forestry education. For 40 years at least they have been searching for an ideal system. They tried to find that system first of all in continental schools. In the year 1885 they decided to open their school in this country at Cooper's Hill. Shortly after that decision was taken the Universities woke up to the necessity of a higher forestry training, and Edinburgh University in 1887 and others following, have spent a great deal of time and money and have undoubtedly advanced considerably the cause of forestry education which did exist at that time. But after having occupied Cooper's Hill for almost exactly 20 years, the Government of India decided then that even there they had not reached the ideal and decided to establish a School of Forestry at Oxford University, and two or three years later, I think in 1908, they threw open their forestry service to probationers from Edinburgh and Cambridge Universities.

But the position at the present moment is by no means a safe one. Already India has decided that, even the co-operation of these Universities has not been the ideal state to which they would have liked to have reached, and, while it has not been ideal from the Indian point of view, it has not been even ideal from the University point of view, because those representatives and others of Universities whose evidence we have taken and with whom we have informally discussed the matter are quite clear in their opinion that a great deal more is desirable; that the two years' course at Oxford, or the three years' course at Edinburgh, which includes technical and theoretical education in forestry and practical work and endeavours to combine with that some course of pure and applied chemistry, is totally insufficient for the purpose of turning out a fully-trained Forest Officer.

It would appear for the moment that after all the searching, and the many attempts, we have still to find what is the best course to be undertaken. With regard to the present or the future position of India, I must speak with a great deal of hesitation. The only actual official knowledge we have upon the matter is that they have a change of educational policy in view, that they

are determined or have decided to train both their Indian and their European probationers at the same school, where there will have to be equal opportunities both for the Indian and for the European, and that provisionally they have, I believe, decided to transfer their school to Dehra Dun. I hope that that is only a provisional decision; I hope, that it may yet be open to change, and that, provided we can put up from here a feasible scheme of education which will fit in with their views, they may be able to throw in their lot with the rest of the Empire and assist in carrying out such a school as we shall propose.

We attach, then, the greatest importance to their participation, partly because of the great experience they have gained in the trials and ups and downs of their 40 years' seeking after the best forestry education, and also because now, at the commencement of a new form of forestry training, it is quite certain that the Indian service alone will supply 40 per cent. of the total students which can be trained at a central institute.

The Report deals mainly with the rival merits of the two schemes, to be under the control of the University or to be outside that control.

There are certain advantages which we are able to set forth in having the school in one University, but the main advantage, and, to my mind the only advantage really of importance, is the financial advantage.

Supposing the scheme is carried on in the University then, so far as the United Kingdom and the Colonial Services are concerned, it is apparent that there should be no definite cost in residential establishment since their students would undoubtedly find lodgings easily at the University itself. But we come to a different position with regard to India in that case. They are not satisfied that their students, Indian and European, should simply be at the same University; they must be in one building, and it is pretty clear that if they have to set up that building at a University, there is not going to be for them a very great saving in the original capital cost of buildings.

But while we recognise the importance of this economy, it should not carry, I think, more weight than reasonably we should give to it, because we see so many advantages in the second scheme of placing our institution outside the boundaries of the Universities. The main advantage is that such an Institution would be under the complete control of a body which would be selected from representatives of all the Governments concerned and whose sole interest in education would be carrying on the best possible education in the interests of the Forest Services.

And then we consider that technical or vocational training on intensive lines is much more fitted to be carried out at a Technical Institute than it is at a University, particularly our older Universities, who quite properly take a much wider view of what education means than what is contained in a purely vocational training.

Then we think it probable that the training would be somewhat less costly to the student. That is, perhaps, not of very much importance because we are going to ask the Conference to recommend that those who are selected for this post-graduate

course shall be given a scholarship sufficient to keep them during the last two years of their training. Lastly, we attach importance to having this Institution located in the best place for it, which I presume would be somewhere in close connection with a forest over which it would have control.

This separate Institute, if it is established, would receive its students fully trained in science, and they would devote the whole time at their disposal, which would be for another two years, to theoretical and technical forestry training and practical work and tours to learn intensive systems of Continental forestry management.

But we have recommended that the research into the production and tending and protection of forests should be attached to this Institute of training. There may be disadvantages in doing so. I think there are advantages; advantages perhaps for the professors; advantages certainly for the students. The fact that research is going on in the same building will gradually accustom the student with the idea of research. Those who show a special aptitude for it could be brought out to carry on that very important branch of the work, and I do not think it is impossible that the specialists engaged in research should be able to devote some portion of their time to educate in their own particular subjects, without interfering with their own primary duty.

A very important part of the work of the Institution will be with regard to refresher or complementary or post-professional courses, or whatever you may like to call them. I believe, if you ask any forester here, you will find a large consensus of opinion among those who say actually: "Although we have learnt at the beginning what we wanted to know, and what completed us for our duties as foresters, yet we are always anxious to come back and refresh that knowledge in view of our experience while we have been in the Service," and I do like the idea of the doors of the Institute always being open to foresters throughout the whole services, so that any time in the course of their career they can come back to that Institute and receive such refreshment and encouragement and additional tuition in the work which they are undertaking.

May I also say that it seems to us important that the location of this Institute should be in the United Kingdom. I think those of us at home who have been about with the delegates from overseas have felt that the forests of the world are undergoing something of a transition; that there is a gradual change from the wild forest to the cultivated forest, and we shall hear much more of artificial regeneration in the future, and the best if not the only place where such work can really be studied is in the intensive systems which are now going on and have been going on for the last 100 years on the Continent of Europe.

It is not, of course, the business of my Committee to advise the Conference in any way. We have dealt with a problem which presents very great difficulties, a problem on which people may very easily hold very different opinions; and though I dare

not advise, may I, with the fullest possible respect, suggest that the function of this Conference is really to advise, as far as possible, the ideal means of education without too great regard to ways and means; because I am confident that if this Conference, which is the first expert body from all over the Empire that has ever dealt with the great question of education, can come to any unanimous decision upon these points, it must have a tremendous effect upon the attitude of the Governments who may be charged with the duty of carrying out policy. I beg to present the Report.

The discussion proceeded as follows :—

Sir CLAUDE HILL : I will deal as briefly as possible with the Indian aspect of this problem. I think it is the more necessary that I should do so because, naturally, having been for five years in charge of the Forest Department in India, I accept the responsibility for the policy which has led up to the formulation of the scheme involving the training of future recruits for the Indian Forest Service at Dehra Dun. That scheme, which I explained in my remarks in introducing the paper on education and research, was designed to meet a combination of circumstances. In the first place, there was the fact that some improvement generally in the system of the training of our future Forest Officers was held to be desirable, and various avenues for securing that improvement had been examined and discussed. There were also, as I fully explained, political developments, one consequence of which would be the recruitment of a certain proportion of Indians to the Indian Forest Service, and the necessity for adapting any improved methods of instruction to that condition of affairs.

Looking at the matter from every point of view, the Government of India would, I think, all along have preferred, if they possibly could have got the conditions which they regarded as cardinal, to continue to recruit and train their Forest Officers for the Imperial Service in the United Kingdom; to recruit, that is, both from India and the United Kingdom, but to have them all trained together in the United Kingdom. I say that advisedly, having discussed the matter at very great length with the present Inspector-General of Forests, Sir George Hart, and everyone else concerned with the matter; but they felt that the present conditions were adverse to securing the best possible results, in respect more particularly to the inclusion among the students of a percentage of Indians. Therefore they came to the decision that unless arrangements could be made in England by which there should be joint training at one Institution, one University perhaps, they would be compelled to arrange for the training in future of Imperial Forest Students under arrangements to be made by themselves. That policy was endorsed by the Secretary of State, and the decision now provisionally stands that in future we are to develop our Research Institute at Dehra Dun to a point which will enable it to train candidates recruited both in the United Kingdom and in India.

Now, it might be held that that decision is irrevocable, but I can say, with complete assurance as regards the Government of India, that all we want there is to secure the best arrangement possible. We thought under the then conditions that the best arrangement possible was Dehra Dun under our own control, because we could not get what we wanted in the United Kingdom; but the Committee, to my mind, which has considered this question has evolved a proposition which renders it absolutely necessary for the Government of India to reconsider the whole matter from the beginning, and I am quite confident that the Government of India will do so.

There are various factors which the Government of India will have to consider in the matter. As I have said, prime consideration will be given to the question of the best possible arrangements, but, obviously, the score of cost cannot be overlooked entirely, and there the Government of India will, I think, undoubtedly be faced, under the scheme outlined in this Report, with an initial cost considerably in excess of what they contemplated for their scheme at Dehra Dun.

I should explain that in Dehra Dun, whether this training of Imperial Forest Officers takes place there in the future or not, the Government of India intend largely to expand their Research Institute and also to enlarge the staff with a view to a more intensive training of their Provincial Forest Services. Nevertheless, a very considerable item in the expenses forecast for Dehra Dun is under the head of provision of quarters for the Imperial students and provision of special additional accommodation for research and tuition on their account, and that cost will be saved if this scheme of an Institute in the United Kingdom matures, and if it is accepted by the Government of India as meeting their needs in the best way possible.

This problem of an Institute for education, as I understand it, and in accordance with the Committee's Report, very vitally affects primarily the Government of India and, in a secondary degree, the Crown Colonies. It has far less bearing upon the Dominions, who will continue, apart from the refresher courses and special courses which they may patronise, to have their own arrangements. It will, therefore, be a question of proportioning the contributions to the teaching side of this Institution as between the Government of India, the United Kingdom, so far as it avails itself of it, and the Crown Colonies.

There is, of course, the further proposal that tuition and research should be combined at that Institute. On that head, I should like to say that Indian experience very strongly endorses the recommendation of the Committee. We had formerly determined that, in the interests both of research and education, they should be centralised at the same Institution; because we believed that research benefits by its association with the necessity for imparting information just as education, of course, benefits by the location adjacent to it of the machinery for research. That

is our experience in India, and I believe that the Government of India will, at all events, welcome that recommendation, and may possibly regard it as an important factor in the acceptance or otherwise of the scheme as a whole.

I think, Sir, that is all I need say at the present stage. I wanted to make quite clear that in my belief, and having been through the whole of these discussions, indeed, having initiated them on the question of the adoption of the Dehra Dun scheme, the Government of India, who have, I should have remarked, more or less determined to hold up the construction of the special quarters for the Imperial Forest Service for a time, will preserve an open mind on the subject and will approach consideration of any proposals such as those contained in the present report in a spirit purely and entirely directed to examining whether it does or does not afford a better solution for their difficulties than the scheme which they themselves had decided to embark upon, and I have every hope that the matter will be considered, if adopted by the Conference, in a spirit of entire detachment and governed only, as far as may be absolutely necessary, from the point of view of financial considerations.

Sir WILLIAM SCHLICH : I am in a somewhat peculiar position. I might call myself a remnant of a past generation, but as I have been specially asked to offer a few remarks I may just give you one or two points out of my own personal experience in instruction.

There are three methods here proposed : an Institution forming part of a University ; one entirely dissociated from it either completely or taking only students who have obtained a degree in science at a University ; and, thirdly, the system which has been proposed, I think, by Professor Stebbing, which means that the students should be selected from those who have taken a degree in forestry at the various Universities of the Empire.

Now, as to that last, I only say that the delegates are practically unanimous in their desire for a central institution founded upon a University education, so that rules the third method out of consideration altogether. Besides, it is ruled out by this practical test ; that is, it has not given satisfaction to the Government of India.

As to the two remaining systems, an Institution directly associated with a University or a dissociated and separate Institution, my experience is that either will do ; it simply depends on the manner in which it is carried out.

However, personally, I have some doubts about the dissociated establishment for various reasons. Of course, if you take men with a degree in science, you can put them in a separate Institution and make first-class foresters out of them. but somehow or other my own experience, which extends over about 60 years, is that many of those separate Institutions do not last. Some of them I have seen started with great *éclat*, and with an excellent staff, and then gradually changes took place, and finally

they were shut up. That has happened over and over again. That is, according to my idea, a little bit unfortunate, and it is due principally to this, that really scientific men, even when they are foresters, do not care to be located at an isolated establishment. You have generally to pay very high salaries, and even then they do not like it, because they prefer to be in contact with people in other branches of science, particularly whom they can readily consult, and at more than one institution this has simply led to their gradually sinking in quality. Institutions started with an excellent staff gradually settled down in many branches to a second-class staff in consequence of that, so personally I believe myself the advantage is with an institution associated in a rational way with a University.

Also we want to see students from all parts of the Empire here. I have serious doubt whether they would appreciate it if they were shut up for a couple of years or more in an isolated establishment. I believe they would prefer to enjoy something of the life and the aspirations connected with the British University. It is all right for those who take an honours degree in science in this country to go to a separate establishment, but whether it will be appreciated by a good many of the Colonies I have some serious doubts. This is what I used to preach at the India Office: "I do not care what University you take, Oxford, Cambridge, Edinburgh, Dublin, whichever you take, only have it all in one place." My object all through my life has been what is best for forestry as such, and we must not sacrifice the interests of the several parts of the Empire for the sake of pleasing a British University.

I should like to add in conclusion that I have found no difficulty whatsoever at Oxford in giving students as much practical instruction as was necessary. Some of my men out of the time they were on the books of the University were as much as eight and nine months in the forest. There is no difficulty about that at all; the difficulty only comes when it comes to a University degree. We can develop the instruction at the University in any way we like if we do not ask the University to give us a degree.

Mr. BATTISCOMBE: I would like to endorse the Report and to say that our men should receive by some means the very best training, and that appears to me to be by the establishment of a central training institution. At the present moment the field for recruiting the teaching staff in forestry training establishments must be, of necessity, to get together all the best men and that can only be done by one institution.

There is one small matter in connection with the establishment of a central training establishment, and that is the institution of *esprit de corps* amongst the foresters of the whole Empire. The men from India and the Crown Colonies and the men from the Dominions coming here for these Refresher Courses will all meet together, they will get to know each other, and thus *esprit de corps* will be established, and I think that is very important, especially

in connection with the establishment of the Empire Forestry Association.

MR. LEGAT : I have carefully considered the various proposals that have been put forward for the training of Forest Officers, and I am of opinion that it is desirable to have a separate institution, thoroughly well equipped, so as to turn out the best qualified men. After all, as the students have to learn their profession in two years, it seems to me very necessary that their training and instruction should be concentrated, and I do not think that, at a University where there are so many distractions, it would be possible to provide such concentrated instruction as there would be at a separate institution.

MR. LANE POOLE : So far as Australia is concerned, I should say she is vitally interested. As you are aware, we hope to establish a forest school in Australia for the training of our own men there, but we cannot hope to bring them to that pitch of training which they can get in England, owing to the fact that we have not got the demonstration areas; we have not the forests to show them as you have in a country where forestry has been undertaken for a century or more, so we must send some of our men on to the proposed central school, choosing the best of them to finish their training.

I feel sure that when this Report reaches the hands of the Forest Authorities of Australia, they will approve of the main general principles which have been laid down, the establishment of one central forest school for the whole of the Empire, the separation of that school from the University, and also a placing of that school under the wing, if not actually under the control, of the Empire Central Forest Authority, namely, the Forest Commission.

I said that we hoped to establish a good forest school in Australia, but with the continual changing of politics and the danger of shortage of funds, it is quite possible we may not establish that school for years to come, so we are in the same position as the representatives from the Crown Colonies. It is possible that for some years we may have to send all our men here, not for a final course, but to take the whole course. They would be graduates from the various universities of Australia. There is, however, I think, a point about which the foresters of Australia will not be wholly in agreement with the finding of this Committee: that is the length of the course. Foresters in Australia would agree with me that a two years' course is all too short to get the forestry teaching that is necessary to equip a man to go back to the Commonwealth and take up his duties as a forester.

MR. FINLAYSON : In the matter of education I think I may rightly say that the bulk of our population in Canada is very much interested. We hold rather democratic views on the subject of education and opportunities are offered for people in all walks of life. I may safely say that, so far as forestry education is concerned in Canada, the majority of the men who go into this profession are men of rather slender means: consequently, so far

as preliminary forestry education, if I may call it so, is concerned, it would be absolutely out of the question for more than a very small proportion of the men who desire to take up forestry as a profession to take an Undergraduate course at a University, centralised in Great Britain, on their own means.

I must also point out that in Canada education is entirely a function of the Provincial Governments. Consequently, we have educational institutions in those different Provinces which are rather jealous of their rights as regards education.

Again, the industry itself varies widely in different parts of Canada. On the British Columbia Coast their methods of utilisation are entirely different from those in Eastern Canada. Consequently, there is a certain demand on the part of the industry that men given their forestry training should be trained in the Province so that they may be familiar with the conditions under which, as administrators, they will have to live.

For these reasons I think that we must, as has been conceded by this Committee, have our preliminary forestry education at least in Canada.

We have, however, in Canada undoubtedly great need for specialists, and it is my sincere hope that, as a result of this Conference, and in particular the work done by this Committee, we may have something new in Canada, that is the establishment on a definite basis of scholarships in forestry, so that some men who have shown particular aptitude in forestry studies may be sent to an institution where they may be able to pursue post-graduate work.

As to whether the institution should be an individual one or should be part of a University, I rather hesitate to express an opinion. The doyen of Foresters, Sir William Schlich, has stated that in his opinion it should be at a University. I rather hesitate to make any remarks to the contrary. I can only give you my personal views based on my own experience, and they are these: that if I had the opportunity of taking up a scholarship and of pursuing post-graduate studies in this country, while I should, of course, very much like at some part of my life to pursue work at Oxford, Cambridge or Edinburgh, some great University, but I should go to such a University, if the Forestry School were there, with a feeling that perhaps some of the courses at least to be given in the Forestry School might be made rather subservient to the other courses in the University. In other words, there might be some slurring over of subjects, some relation of subjects to the general curriculum of the Universities, in such a way that I might feel that I would not do as well as I might do if I attended an institution where the studies were wholly concentrated on forestry and related very directly to forestry.

Mr. DAWSON: I expressed my views on the question of a definite institution last week. I am bound to say, after what I have heard here to-day, and read in this Report, I see no reason to change them. It seems to me that the scheme put

forward has, as a foundation, Indian forestry, and that home forestry has been subordinated. We find that Canada has expressed her views that it does not interest her at all; Australia has started her own. It seems to me incredible it should be proposed that the men for forestry in Scotland and the men for forestry in India should be trained under the same scheme. We have the view of past experience. Sir William Schlich has said that at the University it had proved unsatisfactory, but I point to a bit of more ancient history still. We had a separate institution in this country at Cooper's Hill and it disappeared. I want to emphasise again my honest professional belief that the effect of training at one institution is nil. People are taught or instructed in a groove generally. As time goes on the instructors are succeeded by those whom they instructed, and the instruction goes on in the same way, and no progress is made.

Then there is the question of the staffing difficulty. You can get at the University a staff of the best men at a comparatively low figure on account of the other advantages which are to be found in the University in the way of fellowships and so on, whereas if you transplant your men away from the University you have to pay larger salaries, and you will not attract the best type of instructor.

Another point I see mentioned in the Report here is the difficulty of getting University students to work the whole of the year. I wish to deny that. There is no difficulty in getting University students to perform the practical work in the vacation; no difficulty at all. I speak from experience; there is no difficulty. The suggestion in the Report is hardly just to the undergraduate and the University student. If he is keen on his work you will find no difficulty, if we only get men who *are* keen on the work.

Again, on the question of giving subsidies to men in training, that appears to me to be entirely unnecessary. This is a new idea, more or less, which has sprung up during the war where ex-officers had to get subsidies for training for subsequent work. That applies to the Indian Forest Service and somewhat to the Forest Service in general. For the Indian Civil Service the men will find the means and the ways of getting themselves educated at their own expense, and if the forest man is short of funds, as appears to be the case, why is this scheme brought forward; why adopt a scheme which in every part is more expensive than it need be when existing institutions are used?

I have expressed by own personal view, not the views of my University, as they have had no chance of being officially consulted in this matter so far. They will no doubt be approached by the Forest Commission now and they will have a chance of putting their views forward.

Dr. A. W. BORTHWICK : As regards the term refresher course, that, I think, everyone agrees is merely a matter of terms, but I think a point which Lord Clinton made is a very important

one, that men who have been in the forest practising forestry for some years, probably get out of touch with the most recent ideas and the most recent research, and it would be invaluable for those men to come back to such an institution as the Central Forestry Institution, where they would be able to discuss the newer problems and the different phases of older problems with the people who would have been in touch with the adjacent research institute, so that the refresher course would serve that purpose of disseminating the new knowledge and renewing and keeping those men thoroughly up-to-date. They would be turned out of the school as highly trained experts and these return visits during the refresher course would keep them so.

PROFESSOR STEBBING : I should like just to correct, if I may, an impression I got from something Lord Clinton said. My idea was that the men should take a Forestry Degree or Diploma and then proceed to a Central Institute for a further specialised course of education. In other words, I admitted that in my opinion, as a result of the war—and that is what has really brought it to a head—the Forest Services are going to make bigger demands on their new recruits. The Forest Officers in the future will have a heavier lot of work and will require a very much wider outlook if they are to get through. I did not, however, wish to convey in any way that the Forestry Degree student, when he has left Edinburgh, in the past was not fully trained and sufficiently equipped to go out to a Forest Service. I have not heard from any of the Forest Services to which Edinburgh students have gone, even a whisper that men who have so gone out have proved unsuitable or insufficiently trained.

In the Committee's Report here, we find that the idea is that the student should first take a Science Degree at a University, a very useful thing, and that then he should proceed to the Central Institution and take a two years' course in forestry, and, I understand, allied subjects. Well, if he is only to take a two years' course in forestry and the allied subjects after having got a Science Degree, he is not going to do any more forestry than he does at the present moment. You may condense more perhaps, but, as far as the period goes, he is not able to do more, and you cannot ask him to do so.

With the best intentions in the world, I do not see, even if you have your Central Institution, how you can give the students more than I know is given at Edinburgh, but I wish to provide for more—and my scheme would do so.

Under it you would get your *esprit de corps* quite successfully because all the men selected by the different Governments would meet at the Central Institution and work together there for a time, and, as I believe, the bond would be knit even stronger if they came from different Universities where they learned their forestry training, than if they went there direct without it.

In conclusion I want to emphasise the point that the staff you obtain at a Central Institution of this kind is apt to deteriorate, not willingly, but unconsciously because there is no competition,

and, therefore, they are not kept up to the mark. At the University you must be kept up to concert pitch, if you do not your University goes down.

Mr. PERRÉE : I speak on behalf of all the Sub-Committee when I say that we had in our discussion to go into a certain measure of criticism of existing methods. I hope that it will be taken for granted that we were criticising the system and not individuals. We wish to make that perfectly clear, and if anyone feels at all sore on any point, I wish to offer, on behalf of the Committee, now, a profuse apology.

The first thing that we have to bear in mind in dealing with our matter is the class of man whom we think is necessary for recruitment to the service. We said definitely that we preferred men at the post-graduate stage. Now, I think it would be quite possible within the period of the two years allotted to the course, working the men in the same way that they would be worked if they took up any other profession or line of employment, or any study outside the Universities, to give them a sufficient grounding in forestry to enable them to be useful forest officers. That would not necessarily be the completion of their education, but after officers have had a few years' experience in the woods they generally indicate what I may call a penchant for some particular line of work. Well, then this Institution which we contemplate would provide special courses for these people at a subsequent stage. It seems impossible at the outset, before men have shown their natural leanings towards any particular kind of work, to expect them to benefit from the special courses as much as those who have already practised forestry for a time. I think Mr. Acland's point is excellent that the special courses should aim rather at attracting men after they have already had some experience of practical forestry than at giving them any immediate continuation of their practical training.

Sir William Schlich has assured us that it might be possible really to find ways and means to combine ourselves with some University. We have pointed out certain drawbacks, and I think we should have to adhere to those drawbacks. Nevertheless, I think that if we had been able to examine Sir William Schlich, before we wrote that Report, we should have mentioned that it was impossible to come to a definite conclusion on that point without further inquiry. It seems to me we should have had to go to the Universities each in turn and ask what they were prepared to do for us. We come back, however, to our conviction that, without professional control over the whole of the forestry training, we shall not have what we really want.

There is, of course, the danger of working in a groove, as Professor Dawson has pointed out, but is that danger greater when the control comes from the profession itself, or when it comes from the general educationalists who have not really Forestry at heart?

Mr. CUBITT : I believe myself the Report of this Committee describes what is probably—with certain modifications which may

hereafter be found necessary—the best means for producing the best foresters. The only thing I fear is this: That the Colonies themselves may not be able to turn the course to their own best advantage. It is a question, as I said a few days ago, of giving all Forest Officers trained at such a Central Institution equal opportunities and prospects.

Mr. ELLIS: This is a very difficult question and I cannot say that my views have altogether crystallised yet. I think, in discussing Forestry Education, one may usefully use the analogy of engineering education. It seems to me in both cases there is a theoretic part which can be carried out in any place, and there is a practical part which can only be carried out in the case of engineering in the shops, and in the case of forestry in the forests.

I should be very sorry if anything were done to destroy the Forestry Schools now established in the Universities. I think that to destroy them would be to destroy one of the means of interesting the educated classes in this country in this important matter. If you destroy those courses and centralise and have Forestry Education in one Institution, it is quite clear that nobody who is not going to take up forestry as his sole occupation is going to get any instruction in forestry. You may say he may come, but I do not think he will, whereas if you have the courses at Oxford and Cambridge, the sons of people who have forests, and so on, may take those courses. I should, therefore, like, as far as I can say at present, that our candidates for the forest services of the Crown Colonies should be selected from people who have taken their Diploma, or better, Degree in Forestry at one of the Universities that was in a position to undertake it, and I think the State, in subsidising such courses, should be able to act in a common-sense sort of way and not allow itself to be forced to subsidise every University in the Kingdom because one University has got a course.

When you have selected your person with a Degree in Forestry, what are you going to do with him? Well, we Crown Colonies are not going to put up much money, so we will have to take what other people provide for us.

If there is a Central Institution, I have no doubt we shall be glad to send him there, but I should not be prepared to press the Indian Government to make a central Institution in this country, because it seems to me that, as our people will have to deal with tropical forests, the best place for them to take their practical training is in a tropical country such as India. A man wants to serve a sort of apprenticeship in a profession. If our forest service in our several Colonies is sufficiently large, of course they might be apprenticed in the country in which they are to serve. As matter of fact, our staffs are so small that a man has to be a teacher as soon as he is sent there, in most cases. We do desire a place where a man can be actually taught the tropical problems, and I confess I think the Indian Forests

would be, in most cases, most suitable for giving the practical instruction that we need.

LORD CLINTON : I am glad to say one word, and it will be very short, in reply. First of all, I am very glad indeed to hear from Sir Claude Hill that the Indian scheme, the scheme of Forestry Education for India, is really not definitely settled, but that it is, as I hoped it would be, still open to consideration provided the scheme which will suit their ideas is brought forward here. I think that is of immense importance to the whole discussion.

I wish at once to acknowledge that the scheme which Professor Stebbing put forward was put forward solely with the intention of finding a way out of the difficulty we were obviously in, and I personally was very grateful to him for putting it forward and for a time I was quite attracted by the idea. On further consideration, we had to argue against it, but we did put it forward because we deemed it worthy of consideration and because we thought it was an alternative which was fully worth while for this Conference to consider.

I think also I might say one word on his opinion that the course which we propose will give no further training than the course which he already has in existence at Edinburgh University. Recollect that, in that course the whole of these subjects, pure science and everything are taken side by side. In our proposal your pure science will have been completed and although that science will have to be applied during the course of training, surely the striking out of the essential science teaching will be of immense relief to the theoretical, technical and practical side of forestry. Professor Stebbing has told us that in his view the present course of training for all these purposes will be insufficient in the future, even as practised at Edinburgh. I would quite agree that the two years' course which we propose is short, perhaps too short, but are we to suggest to every man going into the forestry service that he is to put aside more than five years of his educating life for the purpose. I should like to see it longer, but I doubt very much if we could impose that on the service.

I want to say one word with regard to what Mr. Ellis has said. He has shown the importance and we quite agree the hardship of suddenly shutting down University training in forestry. He has shown what a disadvantage that might be to this country because people who did not want to take a full forestry course would then be shut out of training. We assert, however, most definitely that we have a responsibility very much larger in education than educating the forest officer. We recognise that the forests of this country are privately owned, and probably that forever there will be a larger portion of the forests of this country owned by individuals rather than by the State, and it is a direct responsibility upon us to provide education for those who will eventually own and manage forests, and we have suggested that the Universities, if they will agree to undertake the work, should be assisted and encouraged to carry on these classes which Cambridge University is now doing with so great effect, and I believe that for those classes there will be a very great demand.

SIXTH DAY.—Wednesday, 21st July, 1920.

The Reports of Committees were received and discussed in detail.

The Report dealing with Research was adopted and amendments were made and further amendments suggested in the Reports on Education.

The Imperial Forestry Bureau, and the Forestry Survey Draft Resolutions were also presented and received preliminary consideration.

SEVENTH DAY.—Thursday, 22nd July, 1920.

RESOLUTIONS.

Mr. Acland on behalf of the Drafting Committee (Messrs. Acland, Mackay, Finlayson, Legat, and Thompson and Sir Claude Hill) presented the draft Resolutions.

The CHAIRMAN : I will read the introduction :—

“ The British Empire Forestry Conference consisting of the delegates from the Empire, whose names are given herewith, assembled in London in July, 1920, and sat in Committee on July 12th, 13th, 14th, 20th and 21st, and in full session on July 7th and 22nd. After deliberation and discussion they have passed the following Resolutions which they will bring to the notice of their respective Governments.”

1. FOREST POLICY.

I will now call on Mr. Mackay to move the first Resolution, which will be seconded by Mr. Battiscombe.

Mr. MACKAY : “ *Forestry Policy*.—In view of the great importance to the Empire as a whole as well as to each of its component parts of producing a sustained yield of all classes of timber, and of encouraging the most economical utilisation of timber and other forest products, and of maintaining and improving climatic conditions in the interests of agriculture and water supply, each of the Governments of the Empire should lay down a definite forest policy to be administered by a properly constituted and adequate forest service.”

I move the adoption of that Resolution.

Mr. BATTISCOMBE : I should like to second that Resolution.

The CHAIRMAN : Has any gentleman anything to say on this Resolution? Will those in favour of the Resolution express their views in the usual way?

(Carried unanimously.)

2. FOREST SURVEYS.

The CHAIRMAN : Mr. Gibson will move the second Resolution, and Mr. Finlayson will second it.

MR. GIBSON : "*Forest Surveys*.—The foundation of a stable forest policy for the Empire and for its component parts must be the collection, co-ordination and dissemination of facts with regard to the existing forest resources of the Empire, the opportunities for their utilisation, their rate of growth and regeneration, the balance between increment on the one hand and utilisation and wastage on the other, and the requirements of the Empire for all forest products.

"To this end it is of first importance that a systematic survey be undertaken in each part of the Empire, which will not only serve as the basis of forest policy in that part, but also provide a means for reviewing the forestry position of the Empire as a whole.

"A note descriptive of the survey which is desired is appended in Annexure A."

I formally move that Resolution.

MR. FINLAYSON : I have much pleasure in seconding this most important Resolution.

MR. ACLAND : You will have noticed that we have rather expanded the first paragraph of this Resolution. I would explain to those who were not here yesterday that we had a sort of preliminary run over these Resolutions in Committee and that the Drafting Committee has tried to meet certain suggestions that were made. Sir William Schlich suggested that various words should be added to the Resolution as it originally stood, and we have expanded the last part of the first paragraph which now brings in a good many things "dissemination of facts with regard to the existing forest resources of the Empire, the opportunities for their utilisation, their rate of growth and regeneration, the balance between increment on the one hand and utilisation and wastage on the other, and the requirements of the Empire for all forest products." That makes it, perhaps, rather clumsy and heavy, and I am not sure whether it would not be better to cover it all by a more simple phrase, which I think Mr. Robinson is willing to suggest, and simply to say "collection, co-ordination and dissemination of facts as to the existing state of the forests and the current and prospective demands on them." It would then read as follows :—

"The foundation of a stable forest policy for the Empire and for its component parts must be the collection, co-ordination and dissemination of facts as to the existing state of the forests and the current and prospective demands on them. To this end it is of the first importance, etc."

(After discussion the amendment was agreed to, and the Resolution as amended was carried unanimously.)

3. CONSTITUTION AND STATUS.

The third Resolution is "Constitution and Status." I ask Mr. Lane Poole to move that, seconded by Mr. Rogers.

Mr. LANE POOLE: I beg to move the adoption of Resolution No. 3, *Constitution and Status*. "In order to attain continuity in the development of forest resources it is desirable that certain elements of stability be secured in the constitution of the forest policy.

This may be done by the following measures:—

1. The definition, where this has not been done already, of forest policy in a Forestry Act or Ordinance.
2. The reservation for the purpose of economic management and development of forest land under conditions which prevent the alienation of any which is primarily suitable for forests except for reasons consistent with the maintenance of the forest policy as a whole.
3. The assurance to the Forest Authority of funds sufficient to carry out the accepted policy for a series of years.
4. The grant to members of the Forestry service of the Status of Civil servants with due provision for pension.
5. The appointment as the chief officers of the forestry service of persons having a high standard of training in forestry, their selection and promotion being by merit alone.
6. The establishment in each of the larger parts of the Empire and for the Colonies not possessing responsible government, collectively of an officer, or officers, having special duties of advising as to forest policy and surveying its execution."

Mr. ROGERS: I beg to second the Resolution.

Mr. FORBES: I suggest in para. 6 "ensuring its adoption," instead of "surveying its execution."

Sir CLAUDE HILL: I fear that it might be exceedingly awkward for Governments in different parts of the Crown Colonies to have an officer coming round with powers to secure the execution of the policy which he advocated. Surely an officer of that character should be purely advisory and should only be able, just as the Inspector-General of Forests does in India for the different Provinces, to advise the Central Government as to what policy they should suggest to the different component parts. It is for that reason that we inserted the words "surveying its execution," advisedly, because I think it would be quite hopeless to expect that the different Governments, more or less responsible independently, could accept the superimposition on themselves of an officer who could come and say, "You must appropriate so much money for the execution of the forest service." All that such an officer can do is to advise the Colonial Office to suggest to the different Governments such action as will secure uniformity of policy. I venture, therefore, to hope that the Conference will accept the wording as suggested by the Drafting Committee.

Mr. ELLIS: I quite agree with what Sir Claude Hill has said. I could not possibly accept the amendment. As I indicated in a

speech I made in the earlier part of this Conference, I am not wedded to the idea of this Inspecting Officer at all; I did not propose to divide the Conference on the subject, but I certainly should had those words stood. They are entirely incompatible with our system of Government.

The CHAIRMAN : I take it this amendment is not insisted upon?

Mr. FORBES : I do not press my amendment at all, provided the interpretation of the words is not put to an improper use.

(The Resolution was carried unanimously.)

4. ORGANISATIONS OF TIMBER INDUSTRIES.

Mr. GRAINGER : "*Organisations of Timber Industries.*—It is extremely desirable that organisations representing the interests concerned in the extraction and utilisation of timber and forest products should be in the closest contact with the forestry service and that they should be consulted by it in framing forest policy."

I would like to make a suggestion as to the wording. The statement that the forest service should consult the forest industries in framing a policy, rather implies that the Government is excluded from that process. The words "by it" should be left out, and it should read:—"It is extremely desirable that organisations representing the interests concerned in the extraction and utilisation of timber and other forest products should be in close contact with the forestry service and that they should be consulted in framing forest policy."

Mr. MACKAY : I would only say, very briefly, that, in framing this Resolution, we considered very carefully all its terms and we deliberately framed the last clause. It is quite conceivable that at any time, particularly in the great lumbering provinces, the lumber men, as a class, might come into opposition in matters of detailed working of the forest with the forestry service, and we consider it far better that they should carry on their consultations in unison with the forest service rather than go direct to Members or Ministers of either House, say, in the Dominion of Canada or any other self-governing Dominion. The object is to secure harmony between the lumber interest and the forest service; they should not work in friction or in opposition to each other.

Mr. ACLAND : The point is to bring in by the words "by it"—that there should be close contact between the forest service and the interests—whereas, if you say "and should be consulted in framing forest policy" leaving out "by it" the interests might claim in accordance with the terms of this Resolution, to be consulted by the Government, independent of any body representing the forest service, in laying down forest policy, which was not, at any rate, what we had seemed to arrive at by our preliminary discussions.

We all took Mr. Grainger's point that it was essential that the forest service should always keep in close contact with the timber industries, and it was that which we wished to emphasize. But I am rather inclined to think that the alteration makes the point

rather a different one. It may be a desirable one, but it is not that which arose out of our discussions in Committee which were the close contact between Forestry Service and the industries.

Mr. GRAINGER: My only point is that an implication here that a Forest Service and an industry are going to get together to make a policy without reference to the Government is wrong. No Government would consider that an industry, and one of its services should be the dictators of policy.

Sir CLAUDE HILL: I venture to hope that Mr. Grainger will not press the alteration he suggests, because I do sincerely think that he is, perhaps, labouring under a misapprehension as to the intention, as it will be read by other people, of this draft. I think it is a perfectly logical position to suggest that the Forest Service and the lumber interests should be in close consultation with one another, but that the result of their consultation should be what the Government frames its policy upon, and that is really what is in mind in the form in which the Resolution was drafted. I gather from what Mr. Grainger says that it might be apprehended by the lumber interests that the Forest Service was really superimposed on them and that they have no access to anybody else, but surely the Forest Service and the lumber interests will be in very much the same position; they will be, so to speak, joint advisers of the Government concerned, and such advice would only be imparted after mutual consultation. That is the intention of the Resolution. Although I admit that Mr. Grainger is a far better judge of that matter in regard to British Columbia, I suggest that it is possible that the adverse interpretation which he apprehends may not be placed upon the Resolution as drafted.

Mr. GRAINGER: When you say "framing forest policy" it creates an implication which would immediately present itself. I am anxious to promote this sort of thing; I do not want to queer it by looking as if we were trying to undermine the functions of Governments.

Mr. HUNTER: I take it, it would be desirable that, whatever Resolutions we pass, some notice will be taken of them by the Governments who receive them. As far as I can see, this Resolution which we have before us, in my State would not receive any consideration at all, because the forests there, or the greater portion of them, belong to the Government, and the Government, with the advice of their Forestry Officers, frame their own policy, and would not listen to the lumbermen outside in framing that policy in any shape or form. It is true that the Forest Officers would consult and listen to any recommendations that might be made by the lumbermen, but to invite them to assist in framing a policy is the last thing that a Government who are controlling the forest would dream about.

I know the conditions in Queensland are not at all similar to the conditions where, probably, the forests are largely held by private people, but in a case of that sort it strikes me that

a Government should take power, as far as the necessities require, to control the policy even affecting the privately owned forests.

The whole thing, to me, dwindles down to such a degree that I think the Resolution is hardly necessary. I think the common sense of a Government or a Forestry Department would lean towards getting the advice of lumbering men and of persons interested in the timber industry without a Resolution at all.

Mr. FINLAYSON : I have to say that, as far as Canada is concerned, the position referred to by the previous speaker certainly does not exist. In Canada, and particularly in the Province from which Mr. Grainger comes, it is not only advisable for the Government to consult with the industry which is so vitally concerned in the utilisation of forest production, but it becomes absolutely essential for them to do so. Now, in saying this, I do not infer that it is necessary for a Government to act altogether on the advice of lumbermen; otherwise in that case we would have a very unsatisfactory forest policy, no doubt. But certainly it is of the utmost importance that the Government should consult with lumbermen and other persons interested in the utilisation of forest products before framing a forest policy. I think the Resolution is calculated to carry some weight with the Governments, and as far as offending any Government is concerned, I cannot conceive any Government that would be offended by such a Resolution.

The CHAIRMAN : I would like to speak to Mr. Hunter's point, which I hope he is not going to press, because I think that this Resolution is of importance. I think that it has come out quite clearly from the Dominions and also from the Crown Colonies, that there is great importance in linking up those two great interests together. It is really a primary matter: it is connected with the very reason that we have called this Conference together at the same time as the Timber Exhibition was held: we wish to link up in everyone's mind the close connection between the growing of timber and the cutting of it down, and, therefore, we do wish to bring in as much as we possibly can the interests of the individuals who are marketing the timber and who are making economic forestry possible. We wish to link up their interest with ours and educate them as to what their methods should be, and we believe that the only way to bring them into close connection with us is by showing them that we think they should have an opportunity of expressing their opinions as to what is going to be the future policy of the country. After all, in a great many countries the lumbering interest represents one of the most important political forces that exist in the country, and it is essential that we should, if possible, combine that into the whole.

I quite admit what Mr. Hunter has said about the Resolution: it is only a pious opinion: but in the last analysis a great deal of what we have here is only pious opinion expressed, it is true, by the whole of the foresters in the Empire. It is absolutely

in any Government's hands to take that pious opinion or reject it, but I think it is important in some shape or form that this motion should go forward.

Mr. GRAINGER : There is just that one phrase there that is wrong. In our part of the world we have the closest association with the industries that you have anywhere in the Empire. I imagine—I am subject to correction—we have had more experience of any difficulties which may come in when you bring an industry into connection with Government action than anywhere else.

Mr. ACLAND : Would it meet the points raised if it were put in this way :—"It is extremely desirable that the Forest Authority should be in close touch and consultation with organisations representing the interests concerned in the extraction and utilisation of timber and other forest products."

(After further discussion the Resolution as amended was seconded by Mr. Ellis, put to the Conference, and carried.)

5. PUBLICITY.

The CHAIRMAN : I would call on Mr. Legat to propose and on Sir Hugh Shaw-Stewart to second.

Mr. LEGAT : I beg to propose the Resolution.

"*Publicity*.—It is the duty of the Forest Authority in every part of the Empire to adopt methods of education and publicity in order that the people may be fully informed of the aims and purposes of forest policy, and may thus be induced to co-operate towards its successful fulfilment."

Sir HUGH SHAW-STEWART : I have great pleasure in seconding that. I should just like to say that I hope, in striving after accuracy and completeness which I am sure will characterise everything emanating from the Forest Authority, they will not lose sight of the advantage that will arise by dealing with the more general subjects in the most popular and attractive form.

Mr. FORBES : Might I make a suggestion that after the word "adopt" the words "and encourage" should be added. It reads here as if the adoption of these methods of education entirely rests with the Forest Authority. That is not the meaning, I take it.

(The amendment was accepted, and the Resolution as amended was agreed to.)

6. RESEARCH.

The CHAIRMAN : Professor Troup, will you speak as to this?

Professor TROUP : I beg to propose the Resolution on research

"The scheme of research work set out in Annexure B receives the approval of the Conference, and is recommended to their Governments for early consideration and approval by them."

“ This takes the form of the Report from a Committee appointed ‘ to prepare a draft scheme for the organisation of that research work which is essential to the progress of forestry, including both the production and utilisation of forest produce, the Committee to pay particular regard to the importance of avoiding overlapping and of co-operation with existing institutions. The Report deals with the organisation and subdivision of research, with the relation of the different parts of research to one another and to education and practice, and with the subjects of research both generally and in relation to the needs of the different parts of the Empire.”

Mr. THOMPSON : I beg to second that Resolution.

(The Resolution was unanimously agreed to.)

7. EDUCATION.

Mr. ACLAND : The Resolution on Education is as follows :—

“ It should be a primary duty of forest authorities throughout the Empire to establish systematic schemes of forestry education. It has been found for climatic and other reasons that it would not be possible for each part of the Empire to establish a complete scheme of forestry education of its own, and therefore it is essential that those parts of the Empire which are willing and able to establish complete systems should, as far as possible, frame such schemes with a view to combining for meeting the needs of those parts which can only themselves make a partial provision for their requirements.

Part of this subject has been dealt with by a Committee whose Report, which refers to higher training, is approved by the Conference. (Annexure C.)

The main principles embodied in this Report are as follows :—

1. That one Institution for training Forest Officers be established in the United Kingdom.
2. That students be selected from graduates having taken honours in Science at any recognised University.
3. That it be an integral part of the work of the Institution to arrange supplementary courses at suitable centres for students requiring special qualifications and also special courses for Forest Officers from any part of the Empire, whether at the Institution itself or at centres of training in other parts of the world. The Governments should recognise these courses as part of the ordinary duties of the Forest Officer at any time during their service, and should give special facilities to Forest Officers in their service to attend such courses.
4. That a Department of Research into the formation, tending and protection of forests be associated with the training institution.

5. That provision shall be made for forestry instruction for owners and managers of private woodlands who do not desire to take the full course suggested for the Forestry Service. It appears that this is especially applicable to the United Kingdom.

It is also desirable to make adequate provision for woodmen's schools for the training of foresters as distinct from those which are intended for forest officers."

(After discussion the words "pure or natural" were inserted before "Science" in sub-paragraph 2.)

Sir WILLIAM SCHLICH: There is a point upon which I look with some apprehension. In paragraph 7, Education, it says: "Part of this subject has been dealt with by a Committee whose report is approved by the Conference." Is it necessary to say that; would it not suffice to say it is appended?

The CHAIRMAN: The report which will very shortly be in your hands will, by its new wording, make quite clear that while the Conference is committed to the principle of (1) a central place of training and (2) that the type of forest officer required should be the University type, it leaves open the question as to whether that training should be at a University or outside a University. That was raised quite clearly the other day by Mr. Clutterbuck and supported by Sir William Schlich, but there was a division of opinion on the subject as to whether the central place of training should be at a University or not. I need not go into the whole of the arguments pro and con that were stated, but the Committee was authorised to redraft two paragraphs so as to cover that point, and I think now you can safely commit yourselves and accept and approve the draft.

Sir WILLIAM SCHLICH: I quite accept that.

Professor TROUP: There is one point in this Resolution which is we appear to be discouraging Universities from proceeding with higher education in forestry. I think that could be avoided very easily by a slight addition to (1) "That one institution for training forest officers be established in the United Kingdom"; if we put in front of it: "While not wishing to discourage in any way the higher training in forestry established in Universities, we consider it desirable to establish one institution for the training of forest officers." We shall no doubt be open to a great deal of adverse criticism on this Resolution however it is worded, but I think we ought not to expose ourselves to the charge that we are discouraging higher education in the University.

Mr. ELLIS: I think that to put such a paragraph in would only be valuable as a piece of camouflage, because that is exactly what we have been doing, first of all by deciding on the establishment of a central institution, and secondly by the motion we passed just now with regard to demanding a degree in pure or natural science, which, as far as I understand it, excluded a forestry degree from the course of instruction.

Professor TROUP : My point is : We wish to lay stress on the words " Forest Officers " ; I should emphasize it still further and say " Officers of the various Forest Services."

The CHAIRMAN : Have you read paragraph 5, which brings it out quite clearly : " That provision shall be made for forestry instruction for owners and managers of private woodlands who do not desire to take the full course suggested for the Forestry Service. It appears that this is especially applicable to the United Kingdom."

I do not personally object to what you raise, but I do think it certainly makes us liable, if you put it in, to the point that Mr. Ellis has raised. After all, we do want to be honest straight-away. We are certain to have criticism—I, personally, am not afraid of criticism provided I am satisfied that what I am doing is in the interests of the Empire, which I am absolutely persuaded it is, in having a single centre for our forestry training.

I shall not raise objection whether it goes in one way or the other, but I rather think Mr. Ellis hit the point when he classed it " camouflaged." I have every hope that the Universities will continue their training, provided they do not come to the Forest Commission to finance them to the extent of 1½ million pounds out of the 3 millions we have to spend. I see the advantage of these Universities competing for good men, but we have not enough money to-day to go round.

(After discussion the following amendments were proposed by Mr. Acland and adopted :—

Paragraph 2, line 2, substitute : " Committee whose report which refers mainly to higher training of Forest Officers."

Sub-paragraph 5, for first sentence, substitute : " That encouragement should be given to the existing provision made by Universities and colleges for forestry instruction for those who do not desire to take the course suggested for the Forestry Services."

The amendments were adopted and the Resolution as amended was carried on the motion of Mr. Mackay, seconded by Mr. Legat.

8. IMPERIAL FORESTRY BUREAU.

Mr. ROBINSON : I beg to move the Resolution upon the Forestry Bureau :—

" *Forestry Bureau.*—The Conference approve the suggestions and recommendations for the constitution of an Imperial Forestry Bureau which are contained in the report of a Committee appended as Annexure D. and strongly urge upon their respective Governments that they should contribute to the support of the Bureau as therein suggested. They feel that it will be largely upon the work of such a Bureau that the proper development of the forest resources of the Empire will depend, and they therefore cannot over-emphasise its importance as a part of Empire organisation."

Mr. PALFREMAN : I beg to second that Resolution.

(The Resolution was carried unanimously.)

9. TERMINOLOGY AND TRADE NOMENCLATURE.

Professor TROUP : I will begin by reading a draft Resolution which I will ask the Conference to accept.

The heading is "*Terminology and Trade Nomenclature.*"

"The following questions should be referred to the proposed Forestry Bureau immediately on its formation :—

"1. Standardisation of forest terminology.

"2. Correct identification of and standardisation of trade names of timbers."

The first question is the standardisation of forest terminology. I have already referred to the ambiguity which exists in technical terms as applied to forestry. We are all agreed, I think, that something ought to be done to standardise these terms, as far as possible, for all English-speaking countries, and for this purpose the Bureau, when it takes up the matter, ought to get in touch with the American organisations dealing with the same subject. I mentioned some days ago that the Americans have got a Committee on forest terminology and they published in the Journal of Forestry a few years ago what might be termed a glossary of technical terms in use in the United States. Some of these we may find convenient to adopt, others possibly we may not find so convenient, but at any rate we should have to discriminate between terms in general use and local terms.

That is all I have to say on the first subject of forest terminology. The second subject is the correct identification and standardisation of trade names of timber. When that question was first mooted a few days ago I think we rather confused two different questions altogether. I am dealing here entirely with trade names and the correct identification of timbers so as to make the trade name fit in with the scientific name of the timber dealt with. We cannot touch botanical nomenclature here because that is the concern of botanists not of foresters. The botanists are guided by rules laid down by the Vienna Congress, and it is quite beyond our sphere to touch upon the subject at all.

Now, as regards the question of attempting to establish, with more certainty than exists at present, the identity of timbers of commercial use, we are up against a very great difficulty, but I do not think that the difficulty is altogether insurmountable, provided it is tackled in the right way by the Bureau. No doubt we shall be up against a certain amount of opposition from the timber trade, but anything is better than the confusion which exists at present in the case of many timbers on the market as regards their identity. I have known cases of two names being given to the same timber and *vice versâ*, of one name being used for several different timbers. This is a matter for the Bureau to endeavour at all events to put right. It may even require legislation to enforce revision of scheduled names. That is all

I have to say on this Resolution. I would ask the Conference to accept it.

MR. CLUTTERBUCK : I second the Resolution.

(The Resolution was carried unanimously.)

10. FUTURE CONFERENCES.

SIR CLAUDE HILL : I beg to move that the following Resolution be adopted :—

Future Conferences.—The Conference is convinced that the holding of Conferences of Representatives of the Empire on Forestry matters is of great service. They desire to thank the Forestry Commission of the United Kingdom for causing the Conference to be assembled and for making the necessary arrangements. They recommend that the next Conference be held in the year 1923 and that, if the Dominion Government approves, it be convened in Canada."

I feel quite confident that it would be the wish of every member of the Conference that we should place on record in the most emphatic terms the appreciation which we feel of the work done on behalf of the Empire by the Forestry Commission of Great Britain in convening this Forestry Conference. I only wish that we could, as a Drafting Committee, have expressed in warmer terms than is done here—I am afraid it is very bald as drafted—the gratitude which we feel on that account.

I should like also, with reference to the recommendation that the next Conference be held in 1923, to say that I am aware that there is some slight difference of opinion as to when the next Conference should take place, and that that opinion varies between a very early re-summoning of a Conference and postponing it for some 5 years. My own conviction, which I believe will be generally shared, is that the sooner we meet again the better. The reason for that is that we have, as Mr. Grainger felicitously expressed it, reached a stage of very close friendship with one another at present, and of great enthusiasm in the matter of promoting a satisfactory forest policy for the Empire. I know from bitter experience that you do not get more work done by getting a longer time in which to do it and that it is quite possible that greater enthusiasm and energy will be displayed by the Governments whom we have severally the honour to represent if they feel that they have to be ready for another Conference at short notice than if they feel they have five years or so to wait and they need not do very much in the interval. For that reason, some of us were prepared to propose that the next Conference should take place two years hence. In deference, however, to the doubt on this head, it is now suggested that the year 1923 should be fixed, and, in all the circumstances of the case, I understand the Drafting Committee to have felt that 1923 represented the mean between differing opinions, and I venture to hope, Sir, that it will be accepted by the Conference.

MR. ACLAND : I have the honour to second this Resolution, though possibly, as being one of the people referred to in the second sentence of it, I ought not to do so. It gives me the

opportunity of saying just one thing, which I do with a great deal of feeling. It was really hard work, undoubtedly, to make the arrangements for the Conference. But I am perfectly certain I can speak for all the persons on the Forestry Commission of the United Kingdom, or who are connected with it, when I say that none of them can have foreseen that the Conference would be so great a success and would accomplish so much as it actually has been and has accomplished, and particularly, I am sure, none of us thought that it would result in the establishment of such a close bond of friendship and real knowing of one another as has actually been accomplished. The work is not only worth while but ten thousand times worth while, and we are glad to have done it, and would have been glad to do ten times as much when we view the results which have been obtained.

With regard to the year 1923, I think it is the happy mean. As I look at it, you will now have one year in which to hold the Conference, one year in which to recover from having held the Conference, a third year in which to prepare for the holding of the next Conference, and the year 1923 in which the next Conference will actually be held. I think without due time for recovering it would have been difficult to make the next Conference the success which I am sure it will be now, especially as it is going to be held in Canada, and to have made it later would have been too long. I think very possibly we may settle down later on, as forestry is a thing upon which one has to take long views, to a Conference every four or possibly every five years, but I am sure that now, when we are trying to get data with regard to the production, and in different parts of the Empire to work out something in the nature of an Imperial Forest Policy, three years is not too long for the holding of the second series of Conferences. I second the Resolution.

THE CHAIRMAN: May I, in just one word, reply to the thanks which you have expressed through Sir Claude Hill? I would like, if I may, to say that all the work we did we were only too glad to do. I should like on this occasion to make special mention of the work which has been done by Professor Fraser Story and by all those who work under him and with him in his work; by Mr. Sangar and the work that he did in his line, and Miss Baker King as Assistant Secretary, and by all the typists and all who worked in the office. I can assure you that for the last month or six weeks they have worked in season and out of season and the work done there has really been worthy of the good cause for which they worked.

(The Resolution was carried unanimously.)

11. DISTRIBUTION OF PLANTS.

THE CHAIRMAN: We have got to "Other Resolutions." The first one is by Mr. Lucas.

Mr. ACLAND: May I say a word about this? Delegates will remember that it was agreed that any Resolutions which Delegates wished to bring up should be referred to the Drafting Committee. It has been the policy, I think the right policy, of

the Drafting Committee to try to bring up only those Resolutions which they felt would receive practically the unanimous approval of Delegates, and I think we may congratulate ourselves in that way on the results of this morning's reception of our Resolutions; consequently, when we received this yesterday evening we had to consider whether it would be likely to receive the same measure of practically unanimous approval as has been given to our other Resolutions, and we unfortunately thought not. But, of course, it is perfectly in order for any member of the Conference to bring forward any Resolution, and for the Conference to consider it.

Mr. LUCAS: I regret the Drafting Committee has not seen its way to make my Resolution one of the official Resolutions of the Conference.

The Motion which I have very carefully drafted reads thus:—

That with a view to encourage more general planting of trees by citizens of the British Empire, this Conference considers it highly desirable that Government nurseries should be established in the United Kingdom and throughout the Dominions, Crown Colonies and Protectorates, and that forest plants either from such nurseries or other sources should be supplied gratuitously to citizens upon conditions to be settled by the respective Governments.

I appreciate, of course, that one of the objections which would be urged against it would be that the establishment of Government nurseries would conflict with private interests. I have been a Member of the Upper House of the State of South Australia for nearly 20 years and I have never been accused of being an anarchist or a Socialist; I have always been on the other side of the House; but I am bound to say, that where the interest of comparatively few individuals conflicts with the general interests of the Community, then I say the interests of the Community should be paramount in every case. At the same time, in order to meet that objection, I inserted the words here that forest plants to be distributed should be either from Government nurseries or other nurseries. If a Government does not choose to establish its own nursery from which to supply plants free, then it can procure them by arrangement, by contract, from those whose business it is to grow such plants and supply them to citizens.

For 37 years our Government has been giving free to practically all who apply for these forest plants. During that period we have supplied about 55,000 different institutions and individuals, and we have given away over 10,000,000 plants.

It is customary in Australia, and probably in some other parts of the Empire, to have one day in the year an Arbor day in the public schools. The State nurseries supply the whole of the schools of South Australia, which have the room in which to plant forest trees, with these trees gratuitously. Now one of the obvious results of that will be at once apparent to Delegates.

If a child in a public school plants a particular tree, it is incumbent upon that child to look after that tree, to water it and watch it and generally look after it so long as it remains in the school, and in doing that you are creating in the minds of the rising generation an interest in forest trees that probably otherwise they will not possess.

The Local Councils also get trees to plant in parts of their territory which are practically useless for other purposes and very considerable success has attended that practice. One of the things sadly needed all over Australia is more shade for stock, because in the clearing of the country the practice is to get down the timber or the scrub, as the case may be, about the month of September and fire it about the month of February, when it is thoroughly dry and sweeps everything before it. An essential element is that there should be clumps of trees here and there scattered over the farms to protect stock. If a farmer applies for trees he has to apply, in the proper season, to the nurseries, and they are sent to him gratuitously: he only pays the carriage on them. If we adopt this Resolution and send it out to the various Governments throughout the Empire, it is bound to have a good effect. Some member may say "You are pauperising the people; let them supply their own trees." We have free education and many other things are free to-day, and in regard to the encouragement of forestry and the afforestation of denuded areas, if we adopt the resolution which will encourage the Governments to help the settlers throughout their territory to plant trees. I think we are acting on the right lines.

I have no doubt it will be argued that many of the trees which are given gratuitously in this way are not looked after as they should be and they are not the success they might be. Suppose we grant that in our State forests we have, perhaps, 80 per cent. of success, but suppose you only have 20 per cent. of success by giving them to private individuals, that is so much to the good. It costs very little to Government nurseries to rear forest plants and if they are given out in the way I suggest and you have 20 per cent. of success, you are adding to the common stock of timber in the Empire, encouraging people to take an interest in trees which they would not have, and you are assisting on the whole very strongly in the afforestation of the Empire. I commend very cordially this Motion to the Conference.

MR. GIBSON: It is incumbent on this Conference to take the long view and the broad view. What may be of use in one part of the Empire to-day may be of use in other parts of the Empire to-morrow. It is on this ground that I second the Resolution.

MR. LANE POOLE: While generally in agreement with the Resolution, I would desire to move an amendment to it for the deletion of the word "gratuitously" and the insertion in lieu of it of "at cost price." In Western Australia we had the gratuitous or the free distribution of trees for some twenty years

and it led to very serious abuses, and three years ago we introduced the system of distribution at cost price.

We borrowed the system from South Africa, which had always had it, the sale at cost price, with the result that abuses have been done away with and the trees are much better cared for. A man who gets something for nothing is apt to estimate its value at nothing.

Mr. FINLAYSON : Speaking in regard to this Resolution, I desire to state, first of all, that I was a member of this Drafting Committee and, when Mr. Lucas's Resolution was placed before us, I do not think we gave such minute consideration to the fact as to whether there was a necessity in some parts of the Empire for the distribution of forest plants gratuitously, but rather, as Mr. Acland has so well said, that we wanted to place before this Conference Resolutions which we considered should be passed with some considerable degree of unanimity. Speaking for Canada, I may say that we have had a tree planting organisation very actively engaged in the distribution of plants to children, and this organisation has been in existence for some 20 years, and in that time—which I think, if I heard you correctly, Sir, is about half the length of time you have been operating in Australia—we have distributed somewhere in the neighbourhood of 70,000,000 trees. I cannot give you the figure for last year, but for the previous year there were approximately 7,000,000 plants distributed. From this, I think Mr. Lucas will see that we did not cast this matter aside carelessly.

We are interested in Canada in the question of tree planting. We also have a Province in Ontario annually distributing a very considerable amount of tree material; similarly the Province of Quebec has been engaged in this line of work. I may say, speaking for the Dominion Forestry Branch, that within the past few months we have come face to face with that matter, which is emphasized in Mr. Lucas's Resolution, namely, the problem of giving this tree stock away. We have not finally settled our policy because it is a thing to which very considerable study must be given, but understanding that Western Australia has come to the conclusion that it is better to distribute at cost price, I may say that the Dominion Government at the present time are giving very serious consideration as to whether it should or should not do that.

With regard to the Resolution, we all know that the planting of trees is desirable, but I do not think the broad statement can be made that we should couple with that the feature that the stock should be given away, because there is a great deal in what Mr. Lane Poole has said, namely, that the man who has to pay for something, as a general rule, is more likely to value it.

Mr. MACKAY : I must say that, on general principles, I am heartily in agreement with the proposal set out in the Motion of Mr. Lucas, but not on the question of supplying large quantities

of trees gratuitously. It has worked very badly in the past in certain of the States in Australia, certainly in Victoria and, I believe, in New South Wales, and, as Mr. Lane Poole has told you, also in Western Australia.

I may bear testimony in support of what Mr. Lucas has said that the free distribution in the past has, to a large extent, altered the face of the land, as it has provided shelter and shade for settlers over many treeless places. In addition to my knowledge of Australia I can speak of Manitoba and other Prairie Provinces of Canada where liberal distribution of tree plants by Government has greatly improved many extensive areas of bleak and bare land where no trees naturally grew ; but I think if we pass a general Motion urging the desirability of extending free distributions, we shall go rather too far.

The New South Wales Commission, the Commission in Victoria and the Western Australia Conservator have agreed to alter the free distribution system it has held for many years and to charge cost price for all plants issued. In these three Australian States some 300,000 to 400,000 plants were at one time issued free annually. In many cases, I am sorry to say, those tree plants were not looked after properly, on the principle that what you get for nothing does not require much care. You can come up again and get further supplies. That applies in our State, especially to State School gardens, for the improvement of which immense quantities of trees have been distributed. Occasionally I have seen cattle, horses and sheep let into these gardens to graze on the excellent green fodder protected there. It must be borne in mind that the distribution of such trees is not confined to conifers, but large numbers of deciduous trees of great value : fine-foliaged oak, elm, beech, maples and lime trees are produced and distributed in the cooler parts of Australia. These are costly to grow to a period fit for their planting ; many are not issued for a period of four to five years after the first sowing or planting. I think, therefore, the Motion could be amended by leaving out the idea of further free issues ; it might then command much wider support.

Mr. HUNTER : The Resolution rather appeals to me. I think it will have an educational influence. It will create a larger and more diverse interest in forest generally and increase its value and also its usefulness to the public from the health point of view. We have not done it in Queensland, but I think we are getting down to something which is not material to the real purpose of the Resolution when we begin to question whether it should be given gratuitously or whether we should charge cost price for it. That is a matter absolutely for the Government concerned, and I think you could very well amend the Resolution by saying, " gratuitously or at cost price by the Government," which leaves it perfectly open. I suggest that. Beyond that I think we need not concern ourselves more than to express here the desirability of inculcating in our children the value of forestry and the educational influence of the experiment that may be gained by introducing the system.

The CHAIRMAN : There are certain parts of the Empire where the seed merchants and nurserymen are of real value to the country, and I can assure you in fixing our policy in this country we have been most careful to induce them to continue their work and extend it. We are not, however, going to subordinate the interests of the tree-growing population to the interests of a few men, and there I am entirely with Mr. Lucas's point. I would suggest, therefore, an alternative Resolution : " The Conference have had brought to their attention the advantages which have accrued in several parts of the Empire from the wide distribution of forest plants (either at cost price or gratuitously), and desire to bring this method of encouraging tree planting by distributions either from Government or private nurseries to the earnest attention of their Governments." In that form we can subscribe to in this country where we are bound by legislation not to make gratuitous issues to individuals except under certain forms of repayment laid down by Parliament. We cannot get outside this Act, and we should be very sorry not to join in a Motion in which we are in real sympathy and in which we see the great advantages so eloquently pointed out by Mr. Lucas.

Mr. LEGAT : I endorse entirely every word which fell from Mr. Lane Poole on the subject of this motion. What Mr. Lane Poole has said has been borne out by long experience in South Africa, in which country we distribute annually from our forest nurseries something like 5,000,000 trees. I think it would be a great mistake, as far as South Africa is concerned, if we were to revert to the system, which we tried before, of the gratuitous issue, because it led to a tremendous lot of waste of trees and also to the other trouble referred to of trees somehow finding their way into the hands of people who devoted them to purposes for which they were not intended.

Mr. BLACK : The whole idea of the gratuitous distribution of trees in Canada by the Dominion Government was in order to keep within control of the tree-planting division cultivation in advance for these plantations which were intended entirely for shelter belt purposes and to retain control of them subsequent to the actual planting out. They found that outright sale would practically cut off any authority of the tree planting division as regards those thousands of plantations on the individual farms; that the only way by which they could impose their special regulations on the farmers who secured these trees was to give them free, with a proviso that certain conditions be carried out; otherwise it was at all events the view of the Dominion Government that the outright sale of these tree would not satisfy the objects of tree distribution in actually establishing plantations. There was a system of inspectors going about in advance of the planting and subsequent to the planting to see that the shelter belts were actually established. I think that was the original object of free distribution to retain control in the hands of the tree-planting experts.

(The Resolution as amended was carried unanimously.)

BRITISH EMPIRE FORESTRY SOCIETY.

Mr. LANE POOLE : As the result of informal talks as regards the formation of an Empire Forest Association, a Committee was formed to go into the matter, who have drawn up a scheme.

Speaking from an Australian standpoint, there can be no doubt whatever of the great value of linking up various Forest Associations throughout the Empire. In Australia, already the influence of the Australian Forest League has been most marked in Victoria and Western Australia. It has aided the Forest Department in many ways, directly and indirectly. There is no doubt if it is possible to link up that association of persons interested in forestry in Australia with associations in Canada and other parts of the world by the formation of a Central Forest Association, with headquarters in London, a great object will have been achieved. I will read the draft scheme as drawn up by the Committee.

"It is proposed to form a British Empire Forestry Society 'to promote public interest in forestry throughout the Empire.'

"*Membership.*—Organisations, firms and individuals interested in forestry, or in the commercial utilisation of timber, and forest products."

From that it will be seen that the object is to get everybody who takes an interest in forestry into this Society; it is not limited in any way to foresters; in fact, technical foresters would form, I should imagine, a very small part of the membership of the Society.

"*Objects.*—1. To create interest and circulate information relating to forestry amongst all classes in the British Empire."

"2. To bring about better public recognition of the identity of interest between continuous timber supplies and systematic forest management and to spread information relating to the commercial utilisation of Empire-grown timbers and forest products."

"3. To form a centre for the Empire for those engaged in forestry and create a means of communication between the various parts of the Empire."

"*Ways and Means.*—Headquarters of the Society to be in London.

A Council representative of the Empire to be elected at the first Meeting.

An interim Committee to be created forthwith.

All details as to subscriptions, life membership, publications and scope of the Society's work to be left to the Interim Committee."

The question of the formation of the Interim Committee was also one that was discussed by the Committee, and it was suggested that it should represent the various Forestry Societies of England, to begin with the Royal English Arboricultural Society. The Royal Scottish Arboricultural Society would be represented by Sir John Stirling Maxwell; India—Sir Claude Hill; Canada—Mr. Black; British Columbia—Mr. Grainger; Newfoundland—Sir Mayson Beeton; Australia—it was suggested that I should represent them.

It has been suggested that there should be two members for the Crown Colonies; and there remain South Africa and New Zealand, about which suggestions have not yet been made.

Mr. BLACK : Our object should be to carry on an aggressive form of educational work that does not come within the purview of the Forestry Bureau. One of the objects of it is to recognise and stimulate the natural unity of interest between the science of forestry and the business of utilisation, because we must recognise—as it has been recognised here in all these discussions—the value of co-operation as between the timber merchant and limit holder and the forester in private or public employ. It was mentioned in the draft scheme of the Forestry Bureau that publicity work might be carried out by the respective Forest Authorities, and some definition was given as to the objects of that form of forest publicity, but as far as our own experience has gone, official publicity work has very obvious handicaps; for example, our various Provinces are split up into two distinct political units where there are Governments of one colour preponderating in one section of the country and Governments of another colour in other sections, and the Dominion Forestry Branch would hesitate to interfere in sending forestry propaganda or educational work of any sort into the Provinces of the Dominion. Propaganda bearing the stamp of an association of commercial limit holders or of the pulp and paper, or lumber, or any of the other forest industries has also strict limitations.

The strength of the forestry associations has come out with the fact that it can go to any body of people in the country and say frankly and honestly that it has no axe to grind, that it is not tied to any Government, that it is not responsible for any Government policy in the sense of giving political support to the Government, that it is not bolstering up the case of a group of limit holders who may have a particular axe to grind. This complete independence of Government or commercial interest has been the secret of success of any forestry association carried on in any part of the Empire, particularly on educational work.

There is one very apt illustration of the effect of an Empire Forest Association in disseminating information that came up within the last year. Mr. Lane Poole tells me that he borrowed data from Canada in advertising the forest policy in Western Australia. I did not know that, but I did know we had borrowed in Canada Mr. Lane Poole's work in Australia, and his success in getting a Resolution through the Legislature was copied by us in pressing through forestry legislation in Canada, although the reciprocity was unknown to both of us.

Mr. MACKAY : I may say that a few years ago there was no such thing as a Forestry Association in Australia, and about the year 1911 when there was a conference of representatives of the several Forest Departments of Australia in Sydney, I brought forward the question of establishing such an association, somewhat on the lines of the great American Association. Most of the representatives at this conference are doubtless aware of the excellent work achieved by that Association. You have heard

how the Canadian Association has developed, and work on similar lines is being undertaken in nearly every State of the American Union. I think these Associations have not only assisted in the spread of actual knowledge as to the growth of trees and the production of timber, but they have greatly assisted the Forest Department at Washington whenever there has been friction or conflict in regard to debateable matters such as conservation and forest reserves generally. The Association which we established in Australia has branches in various States, and has been of the greatest assistance during the progress of Bills through the Legislatures of Victoria, New South Wales and Western Australia. Members of the Association gladly helped us in bringing the objects of systematical forest management before the States. Therefore, they are entitled to our thanks for the practical help they gave us throughout on the many questions which were at issue.

Sir HUGH SHAW-STEWART: I have spoken of the importance of publicity work on popular lines and I have been very much struck by what has been said by the gentleman from Canada as to the difficulties which lie before an Official Authority, distributing information in a popular fashion, as this might possibly lead to misunderstanding in different localities which have their own interests. I quite see that such an Association as this, with greater freedom than an Authority has, is just the very thing we want for what we all desire, namely, the dissemination and encouragement of popular knowledge on forestry.

Professor HENRY: I am greatly in favour of publicity and have been very much impressed, in the course of conversation throughout the Conference, with the views of the Members from Canada and the Dominions on this question. They seem to have a much better grasp of the necessity of advertisement in the present day, and if the Forestry Authority cannot lead the way in publicity as I hope they will do—of course we can fall back upon this Empire Forest Association.

I really got up to make a suggestion that certain kindred Societies ought to be asked to join it. For example, we know what a great work was done in England in the Eighteenth Century by the Royal Society of Arts, which issued premiums and stimulated a great deal of the planting done at the time in England. Many of the magnificent pine forests round Woburn were the result of a prize which was awarded by that Society. Similarly, in Ireland the Royal Dublin Society might be asked to join in. We have there also two Forestry Associations, an Irish Forestry Society and an Arboricultural Society, which is linked up with the Royal Horticultural Society of Ireland, and both would join.

I take this opportunity of telling the members here of a rather interesting historical fact, namely that the first Forestry Society which was founded in the United Kingdom was founded in Dublin in the year 1831 and was called the Irish Arboricultural Society. It included many of the leading land owners of the day and issued a volume of transactions which is of considerable interest. There may have been some unnecessary words of despair

about Ireland during this Conference, but seeing that we inaugurated the first Forestry Society of the Empire, we have something to our credit after all.

Mr. GRAINGER : I beg to propose a Resolution which would give our project a good start. It would not be intended as an official Resolution to be brought to the notice of the Governments, but if passed, as I hope it would be unanimously, it would show that we were all at the back of this Society and give the detailed proposals the real impetus which they need.

“That the proposals outlined herewith meet with the approval of delegates and that the formation of an Association upon the lines indicated is, in the view of the Conference, of great importance in the interests of the whole forestry movement, and should be taken up vigorously throughout the Empire.”

Mr. CLUTTERBUCK : I beg to second the Resolution.

(The Resolution was carried unanimously.)

FIRE PROTECTION.

The CHAIRMAN : I think it might now be of value, if you agree, that we should ask Mr. Kilby, of the Canadian Railways, to give us some ideas on the subject of fire protection. Fire, as we know, is an important matter for foresters all over the world, and I suppose there is no one else in the Empire who speaks with more authority than Mr. Kilby on this subject.

Mr. KILBY : As an official of the Canadian National Railways, charged with Forest Protection, I think the delegates may have overlooked the important part the railways play in connection with forestry. The railways in Canada are not alone concerned with protection, but with the transportation and utilisation, and are also large timber holders. I have not, unfortunately, had time to prepare details, but I will go into each heading briefly.

With regard to protection, I believe we may safely say the Trans-continental railways of Canada employ more men in the actual protection of our forests than any other organisation. We not only employ specialists—I mean by that men who do nothing else but fire protection—we employ every official employed on our railways. The instructions are handed from one office, from the General Manager's office; and there is this difference between us and another Government organisation—the Canadian National Railways is now a Government organisation too—that we have the powers to inflict disciplinary measures on the officials or employees who fail to live up to our conception of fire protection. We are governed in this sense by the Board of Railway Commissioners and by the actual Forestry Associations in the Provinces through which we run. Mr. Clyde Leavitt is in charge of the work for the Board of Railway Commissioners and I know he will bear me out that we do not alone comply with his instructions, but in some places we exceed them. We are very much in

the position of the patient and the doctor; he administers the medicine, we take it, and although at first we did not like it we found it very much to our good and the public good.

It would take too long to go into the detail of how we handle this, but it is very simply done by notices. Incidentally, we post about 6,000 notices. These notices are posted at every station and at inaccessible points which are not reached by any other publication. We carry out this system in our time-tables; we use what we call "dodgers" on our menu cards, and we also post notices in our observation cars for the benefit of passengers.

With regard to the question of fire protective appliances on engines, these are far in excess of what the Board of Railway Commissioners ask of us. We not only keep our engines in perfect order as far as the provision of fire protective appliances is concerned, during the Summer season, but throughout the whole of the year.

Now with regard to transportation, most of the delegates would not have been able to attend this Conference if we had not had railways, and railways would not have been there if it had not been for the timber, so there is a very close connection between timber supplies and railways, and even the transportation of your seeds, your logs and your finished products, necessarily must depend upon the efficiency of your railways. So we have a very large interest in forestry and a very large financial interest, which a Corporation like a railway must take notice of; that is to say we extract from timber manufacturers and loggers quite a considerable amount of money in freight, which forms a considerable part of the income of the Trans-Continental Railways of Canada.

With regard to utilisation, I do not know who would use more timber than the Trans-Continental Railways. I think in the replacement of ties—or, as you call them in this country, sleepers—we use something like 3,000,000 annually and I know at the present time we are paying twice as much as we did before the war. That may be due in part to the increased cost of labour, but to whatever it is due, the fact is that our timber supplies are receding and we are unable to buy so cheaply. Consequently, we have to look to the future and we will have to look to a forest policy which is to ensure us the supply of ties necessary to operate our railroads. That, I think, covers utilisation.

With regard to timber holders, we have not at the Canadian National Railways any trained forester—personally I am not a trained forester—but we hold large timber limits and we are closely in touch with every Provincial organisation as we hold those limits in practically every Province in Canada. Consequently, any legislation affecting the handling of those limits very much affects the Railway Company.

There is one very important feature which I think our Railway can help out as much as any Railway Company or any other

organisation in any part of the Empire ; that is in publicity. We have so many means, and they are cheap means, for Government organisation. We have so many employees and officials and they represent in Canada a very large proportion of the male population. Now we can get at all these people and do get at them, and I can assure you that, as far as the Canadian National Railway is concerned, there is only the kindest feeling existing towards any right forest policy. I would particularly like to mention that the feeling existing between myself as the representative of the Canadian National Railway and my brother delegates from Canada is the very kindest. We do not have any quarrels or difficulties. Sometimes they use the "big stick," but we always dodge it and come to terms. I could tell you a lot in detail, but I do not think it would be of much value now, but I would be very, very glad to furnish any delegates with detailed information relating to the handling of the work from the inside of the Railway if they care to apply for it. (Applause.)

The CHAIRMAN : Gentlemen, I think that offer which Mr. Kilby has made is a most valuable one, especially with regard to fire protection, in which we are very much interested, and I can assure him that, as far as our Commission is concerned, we shall be the first to write.

(Mr. Acland having been moved to the chair, the Annexures relating to the Survey, the Imperial Forestry Bureau, and Education were presented in their final form, discussed and adopted. It was further agreed that the Drafting Committee arrange the Resolutions in the form most suitable for publication.)

The Conference then terminated.

RESOLUTIONS PASSED AT THE MEETING HELD ON 22nd JULY, 1920.

The British Empire Forestry Conference, consisting of the delegates from the Empire whose names are given herewith, assembled in London in July, 1920, and sat in Committee on July 12th, 13th, 14th, 20th and 21st, and in full session on July 7th and 22nd. After deliberation and discussion they have passed the following resolutions which they will bring to the notice of their respective Governments.

1.—FOREST POLICY.

In view of the great importance to the Empire as a whole, as well as to each of its component parts, of producing a sustained yield of all classes of timber, and of encouraging the most economical utilisation of timber and other forest products, and of maintaining and improving climatic conditions in the interests of agriculture and water supply, each of the Governments of the Empire should lay down a definite forest policy to be administered by a properly constituted and adequate forest service.

2.—SURVEY OF RESOURCES.

The foundation of a stable forest policy for the Empire and for its component parts must be the collection, co-ordination and dissemination of facts as to the existing state of the forests and the current and prospective demands on them.

A note descriptive of the survey which is desired is appended in Annexure A.

3.—CONSTITUTION AND STATUS.

In order to attain continuity in the development of forest resources it is desirable that certain elements of stability be secured in the constitution of the forest policy. This may be done by the following measures:—

- (1) The definition, where this has not been done already, of forest policy in a Forestry Act or Ordinance.
- (2) The reservation for the purpose of economic management and development of forest land under conditions which prevent the alienation of any which is primarily suitable for forests except for reasons consistent with the maintenance of the forest policy as a whole.
- (3) The assurance to the Forest Authority of funds sufficient to carry out the accepted policy for a series of years.
- (4) The grant to members of the forestry service of the status of civil servants with due provision for pension.
- (5) The appointment as the chief officers of the forestry service of persons having a high standard of training in forestry, their selection and promotion being by merit alone.
- (6) The establishment in each of the larger parts of the Empire and for the Colonies not possessing responsible government collectively, of an officer or officers, having special duties of advising as to forest policy and surveying its execution.

4.—ORGANISATION OF FOREST INDUSTRIES.

It is extremely desirable that the Forest Authority should be in close touch and consultation with organisations representing the interests concerned in the extraction and utilisation of timber and other forest products.

5.—PUBLICITY.

It is the duty of the Forest Authority in every part of the Empire to adopt and encourage methods of education and publicity in order that the people may be fully informed of the aims and purposes of forest policy and may thus be induced to co-operate towards its successful fulfilment.

6.—DISTRIBUTION OF FOREST PLANTS.

The Conference have had brought to their attention the advantages which have accrued in several parts of the Empire from the wide distribution of forest plants, and desire to bring the method of encouraging tree-planting by distribution of plants either from Government or private nurseries gratuitously or at cost price to the earnest attention of their Governments.

7.—TERMINOLOGY AND TRADE NOMENCLATURE.

The following questions should be referred to the proposed Imperial Forestry Bureau immediately on its formation :—

- (i) standardisation of forest terminology ;
- (ii) correct identification of timbers, and standardisation of their trade names.

8.—RESEARCH.

The scheme of research work set out in Annexure B receives the approval of the Conference, and is recommended to their Governments for early consideration and approval by them.

This takes the form of the report from a Committee appointed " to prepare a draft scheme for the organisation of that research " work which is essential to the progress of forestry, including " both the production and utilisation of forest produce, the Com- " mittee to pay particular regard to the importance of avoiding " overlapping and of co-operation with existing institutions." The report deals with the organisation and sub-division of research, with the relation of the different parts of research to one another and to education and practice, and with the subjects of research both generally and in relation to the needs of the different parts of the Empire.

9.—EDUCATION.

It should be a primary duty of Forest Authorities throughout the Empire to establish systematic schemes of forestry education. It has been found for climatic and other reasons that it would not be possible for each part of the Empire to establish a complete scheme of forestry education of its own, and therefore it is

essential that those parts of the Empire which are willing and able to establish complete systems should, as far as possible, frame such schemes with a view to combining for meeting the needs of those parts which can only themselves make a partial provision for their requirements.

Part of this subject has been dealt with by a Committee whose report, which refers mainly to the higher training of forest officers, is approved by the Conference (Annexure C).

The main principles embodied in this report are as follows :—

1. That one institution for training forest officers be established in the United Kingdom.
2. That students be selected from graduates having taken honours in pure or natural science at any recognised University.
3. That it be an integral part of the work of the institution to arrange supplementary courses at suitable centres for students requiring special qualifications and also special courses for forest officers from any part of the Empire, whether at the institution itself or at centres of training in other parts of the world. The Governments should recognise these courses as part of the ordinary duties of the forest officer, at any time during their service, and the Governments concerned should give special facilities to forest officers in their service to attend such courses.
4. That a Department of Research into the formation, tending and protection of forests be associated with the training institution.
5. Encouragement should be given to the existing provision made by Universities and Colleges for forestry instruction for those who do not desire to take the full course suggested for the forestry service. It appears that this is especially applicable to the United Kingdom.

It is also desirable to make adequate provision for woodmen's schools for the training of foresters as distinct from those which are intended for forest officers.

10.—FORESTRY BUREAU.

The Conference approve the suggestions and recommendations for the constitution of an Imperial Forestry Bureau which are contained in the report of a Committee appended as Annexure D, and strongly urge upon their respective Governments that they should contribute to the support of the Bureau as therein suggested. They feel that it will be largely upon the work of such a Bureau that the proper development of the forestry resources of the Empire will depend, and they therefore cannot over-emphasise its importance as a part of Empire organisation.

11.—FUTURE CONFERENCES.

The Conference is convinced that the holding of Conferences of Representatives of the Empire on forestry matters is of great service. They desire to thank the Forestry Commission of the United Kingdom for causing the Conference to be assembled and for making the necessary arrangements. They recommend that the next Conference be held in the year 1923 and that, if the Dominion Government approves, it be convened in Canada.

List of Delegates who attended the Conference.

UNITED KINGDOM.

Major-General LORD LOVAT, K.T., K.C.M.G., D.S.O., Chairman of the Forestry Commission.
 The Rt. Hon. F. D. ACLAND, M.P., Forestry Commissioner.
 Mr. R. L. ROBINSON, O.B.E., B.A., B.Sc., Forestry Commissioner.
 Sir WILLIAM SCHLICH, F.R.S., K.C.I.E.

ENGLAND AND WALES.

Mr. HUGH MURRAY, C.I.E., C.B.E., Assistant Forestry Commissioner.

SCOTLAND.

Mr. JOHN SUTHERLAND, C.B.E., Assistant Forestry Commissioner.

IRELAND.

Mr. A. C. FORBES, O.B.E., Assistant Forestry Commissioner.

AUSTRALIA.

COMMONWEALTH.

Mr. C. E. LANE POOLE, Conservator of Forests, West Australia.
 Mr. H. R. MACKAY, Commissioner of Forests, Victoria.

SOUTH AUSTRALIA.

The Hon. EDWARD LUCAS, Agent-General.

VICTORIA.

The Hon. Sir PETER McBRIDE, Agent-General.

QUEENSLAND.

The Hon. JAMES McEWAN HUNTER, Agent-General.

WEST AUSTRALIA.

The Hon. Sir J. D. CONNOLLY, Agent-General.

TASMANIA.

Mr. A. H. ASHBOLT, Agent-General.

CANADA.

DOMINION.

Mr. E. H. FINLAYSON, Forestry Branch of the Department of the Interior, Ottawa.

Mr. ROBSON BLACK, Secretary, Canadian Forestry Association.

Mr. C. LEAVITT, Chief Forester, Commission of Conservation, Ottawa

Mr. ELLWOOD WILSON, Chief Forester, Laurentide Paper Company, Quebec.

Mr. W. H. KILBY, Canadian National Railways.

BRITISH COLUMBIA.

Mr. M. A. GRAINGER, Chief Forester, Provincial Forest Service.

QUEBEC.

Mr. A. BÉDARD, Assistant Chief Forester, Provincial Forest Service.

INDIA.

The following representatives of the Government of India :—

Sir CLAUDE HILL, K.C.S.I., C.I.E., Member of Viceroy's Executive Council.

Mr. P. H. CLUTTERBUCK, C.I.E., C.B.E., Chief Conservator for United Provinces.

Mr. A. J. GIBSON, Conservator of Forests.

Mr. W. F. PERREE, C.I.E., President, Imperial Forest Research Institute, Dehra Dun.

Professor R. S. TROUP, C.I.E., formerly of the Indian Forest Service.

NEWFOUNDLAND.

Sir MAYSON M. BEETON, K.B.E., Newfoundland Development Company.

Mr. D. JAMES DAVIES, B.Sc., Department of Agriculture, Newfoundland.

NEW ZEALAND.

The Hon. Sir THOMAS MACKENZIE, K.C.M.G., High Commissioner.

UNION OF SOUTH AFRICA.

Mr. C. E. LEGAT, Chief Conservator of Forests.

CROWN COLONIES

COLONIAL OFFICE

Mr. W. D. ELLIS, C.M.G., M.A

CEYLON.

Mr. J. D. SARGENT, Deputy Conservator of Forests.

EAST AFRICAN PROTECTORATE.

Mr. EDWARD BATTISCOMBE, Conservator of Forests.

FEDERATED MALAY STATES.

Mr. G. E. CUBITT, Conservator of Forests.

GOLD COAST.

Mr. N. C. McLEOD, Conservator of Forests.

NIGERIA.

Mr. H. M. THOMPSON, C.M.G., Director of Forests.

NYASALAND.

Mr. J. M. PURVES, Chief Forest Officer.

SIERRA LEONE.

Mr. L. PALFREMAN, Conservator of Forests.

TANGANYIKA TERRITORY.

Mr. D. K. S. GRANT, Conservator of Forests.

TRINIDAD.

Mr. C. S. ROGERS, Conservator of Forests.

UGANDA.

Mr. R. FYFFE, Chief Forest Officer.

EGYPT AND THE SUDAN.

Mr. W. A. DAVIE, Sudan Agricultural Department.

Major R. E. FISCHER, Sudan Agricultural Department.

Secretary,

Mr. O. J. SANGAR, M.C.

Assistant Secretary,

Miss G. BAKER-KING.

ANNEXURE A.

FORESTRY STATISTICS AND SURVEYS.

In order to give a complete picture of the forest resources of the Empire and of the prospects of their maintenance and development, there will be required both information of a purely statistical nature which Governments should collect and publish at definite intervals, and surveys of which the results will be presented in tabular form and by means of maps. It is clear that the value both of the statistical information and of the surveys will largely depend upon the possibility of comparing the facts exhibited at different dates—annual, quinquennial or decennial—and upon having all the data prepared upon the same principles throughout the Empire. Methods must therefore be standardised. To this end the Imperial Forestry Bureau, if established, should make it part of its first work to assist the different parts of the Empire both in the compilation of statistics—by revising, and where necessary, correcting the tables contained in the statements which all parts of the Empire were asked to fill up before the Conference was held—and in working out methods of survey and map-making.

It will, however, take some time before the Bureau can undertake this work, and longer before it can be fully discussed and agreed upon with all concerned. A brief sketch is therefore given of the information which is desired, and of what the survey should cover, in order that all parts of the Empire may make arrangements in advance for producing as full results as possible, at any rate, by the time of the next Conference.

It has not yet been possible to consider the revision of the tables given in the "Statement" in detail, and they are therefore reprinted herewith in their original form, but the proceedings of the Conference have indicated that certain modifications in them are necessary.

(1) A differentiation should be made between hardwoods and softwoods, the division being that which is generally accepted locally. The botanical names of the species of the woods which are included in each class should be given. The differentiation between hardwoods and softwoods should be made in all the tables.

(2) A differentiation should be made between timber which is "available" and timber which, though "merchantable" (*see* Table I.) is not "available" under existing conditions. It is the former which is of chief importance. By available is meant that which in its stage of growth at the time of the survey or any later stage, at the then existing prices and with the then existing means of extraction and utilisation, it would pay to utilise.

The differentiation between "available" and "unavailable" forest should be made in Tables I., II., III. and VII.

(3) A corresponding differentiation should be made between the increment in forests which are "available" and the increment in forests which are not "available."

Estimates of increment are difficult to furnish, but every effort should be made to furnish them at any rate of the "available" timber, and it is believed that this ought to be possible.

(4) A distribution should be made of the area of forests over two or more age-classes in order to ascertain to what extent regeneration has been keeping pace with cutting.

With regard to the distribution of age-classes, it is suggested that the "available" forests only be classified, and that the headings of Table II. be used. It is realised that it may be very difficult to complete such a statement in countries where extensive areas have to be dealt with, but it is contended that even such a rough classification as "no second growth," "successful second growth" and "virgin forest" would be a first step in the right direction.

With regard to "available" timber which has a value for local use or export, the values per acre should be indicated, as this would clearly greatly enhance the usefulness of the survey to persons interested in timber utilisation.

The survey as has been indicated, should be both statistical and geographical and should be illustrated with maps on a suitable scale.

TABLE I.

Statement showing the Total Area of Forest and the Percentage of the Land Area covered by Forest.

—	Agricultural Land.	Forest.			Other Land.	Total.
		Merchantable.	Unprofitable or Inaccessible.	Total.		
Square miles						
Percentage of total land area						
Percentage of total forest area.						

TABLE II.

Classification of the Forest Area by Ownership.

—	Area belonging to					Total.
	The State.			Corporate Bodies.	Private Individuals.	
	Dedicated to Timber Production.	Other Forest.	Total.			
Square miles						
Percentage of total forest area.						

TABLE III.
Annual Increment.

	Area. Sq. Miles.	Estimated Increment per Sq. Mile.	Total Gross Incre- ment.	Loss.			Net Incre- ment (Col. 4 minus Col. 7).
				Fire.	Waste, Decay, &c.	Total.	
1.	2.	3.	4.	5.	6.	7.	8.
Under State Control							
Other							
Total							

TABLE IV.
Annual Utilisation.

	Type of Product.	Quantity.	Value at the Place of Preparation.
1.	2.	3.	4.
Under State control ...			
Other			
Total			

TABLE V.
Forest Industries.

Industry.	Volume of Timber consumed.	Value of Product at the Place of Preparation.	No. of Persons employed.
Total			

TABLE VI.
Average Annual Exports and Imports.

Type of Product.	Exports.		Imports.		Balance, plus or minus.	
	Quantity.	Value f.o.b.	Quantity.	Value c.i.f.	Quantity (Col. 2 minus Col. 4).	Value (Col. 3 minus Col 5).
1.	2.	3.	4.	5.		

TABLE VII.

Type of Product.	Utilisation (Table IV., (Col. 3).)	Exports (Table VI., Col. 2).	Home Consump- tion of Home- grown Timber (Col. 2 minus Col. 3).	Imports (Table VI., Col. 4).	Total Home Consump- tion of Home and Imported Timber (Col. 4 plus Col. 5).	Net Incre- ment (Table III., Col. 8).	Balance plus or minus (Col. 7 minus Col. 6).
1.	2.	3.	4.	5.	6.	7.	8.
Total per head of } population ... }							

ANNEXURE B.

RESEARCH.

Report of the Committee appointed " to prepare a draft scheme
" for the organisation of that research work which is essential
" to the progress of forestry, including both the production and
" utilisation of forest produce, the Committee to pay particular
" regard to the importance of avoiding overlapping and of co-
" operation with existing institutions."

The Committee beg to report as follows :—

1. We desire to emphasise the importance of systematic research work in developing the growing and utilisation of timber and other forest products. So far the need for research, while generally appreciated by responsible forest officers, has not received that general recognition which the subject demands.

2. We believe that in order to secure adequate progress three principles should receive attention :—

(1) That the State is primarily responsible for forestry research work. This is so for a number of reasons. Forest problems are of national importance, while a considerable proportion of the forests of the Empire are state-owned and state-managed. Forest problems frequently require long periods of time and co-ordinated effort for solution. The State alone can meet these demands.

(2) Research work on an adequate scale can be efficiently conducted only by men who are qualified by training and taste for research and who are not hampered by routine or administrative duties. Evidence has been placed before us showing that disregard of this principle has frequently led to a complete cessation of progress in research.

(3) The salaries and status of research officers should be such as to attract and retain the services of the most highly qualified men.

SUBDIVISION OF RESEARCH.

3. Forest research work can conveniently be divided into two main branches :—

(1) The growing of forest crops.

(2) The utilisation of timber and other forest products.

Each of these two main branches can be considered from two points of view, viz., the general and the local. The general point of view regards the principles or methods governing research work, *e.g.*, the methods of compiling and co-ordinating statistics of growth, whereas the local point of view is concerned with the application of a principle to a limited range of conditions, *e.g.*, the silvicultural study of a species of purely local interest.

General research may consequently be conducted at one centre for very wide areas; local research, on the other hand, must be conducted on the spot. Both are important and neither should be neglected.

RELATION OF THE TWO MAIN BRANCHES OF FORESTRY RESEARCH.

4. Research on the growing and research on the utilisation of timber and forest products are obviously intimately connected, and it is necessary for the two branches of research to be closely co-ordinated both in their actual conduct and in the administration responsible for them. From their nature, however, they cannot always be contained in one institution. It may be argued that the centre for silvicultural research should be in or near the place of production (the forest), while research in utilisation should be carried out in or near the principal centres of consumption, which are frequently remote from forests. We consider it undesirable to attempt to lay down any hard and fast rule in this matter, and believe that provided adequate co-ordination is secured there is no reason why the two branches of research may not be successfully conducted either together or apart as circumstances may dictate.

RELATION OF RESEARCH TO EDUCATION.

5. Although the duty of research officers will be primarily to carry out research work, we consider that they should devote a limited portion of their time, if necessary, to educational work in their own subjects; this, we hold, will be of advantage not only to the student but also to the research worker himself, besides leading to an economy in staff.

RELATION OF RESEARCH TO PRACTICE.

6. We consider that research work will lose a great part of its value unless it can be followed to its logical conclusion, namely, its application to practice. Apart from the publication of results in the form best calculated to make the information useful to

those who can benefit by them, there is the necessity for ensuring that the results are applied, if only on a small scale, to practice, and that the results of this practical application are recorded. In this way a definite chain is established, for example, between the laboratory, the experimental plot and the forest.

AGENCY OF RESEARCH.

7. We have already remarked that the State is primarily responsible for forestry research work. If this principle be accepted the further principle of State control and subsidy follows. As regards the agency of research, the work may be carried out either directly by the State, through its own officers, or through the medium of Universities or other institutions, associations or individuals. This is again a question of meeting local circumstances.

SUBJECTS FOR RESEARCH.

8. The chief problems with which forestry research deals may be grouped under the following heads :—

A.—Research into the growing of forest crops.

- (1) Silviculture, including regeneration and silvicultural systems.
- (2) Statistical investigations as to rate of growth and volume production, which alone can provide the data essential for rational and economic forest management.
- (3) Forest botany, including ecology and mycology.
- (4) Forest entomology.
- (5) Soil investigations.
- (6) Meteorology.

B.—Research into the utilisation of timber and other forest products.

- (1) Wood technology, including the testing, seasoning, and preservation of timber.
- (2) Investigations into products other than timber.

Most of the research problems of outstanding importance fall under the head of silvicultural, statistical (that is the collection and collation of data dealing with rate of growth and production), or technological (from which we exclude any questions which fall rather under the head of administrative or executive work). From the evidence at our disposal we are convinced that in no part of the Empire is sufficient attention devoted to the investigation of silvicultural and statistical problems, considering their great importance in connection with the future maintenance and economic working of the forests. We therefore recommend that each part of the Empire should include in its forest service at least one research officer, and that adequate funds should be placed at his disposal to ensure progress in those branches of research. We recognise that in some cases a small service may not have funds for the immediate appointment of more than one

research officer ; in such a case we hold strongly that this officer should be specially trained in silvicultural and statistical work.

Problems connected with other branches of forest research vary in degree in different localities, but, wherever conditions demand it, we recommend that similar steps be taken to ensure the progress of research in the branches concerned.

We desire here to record the fact that in our opinion forestry research in its various branches, including investigations into the properties and utilisation of timber, have not hitherto received wide enough recognition from non-official sources, and we would venture to draw the attention of organisations and individuals interested in the subject to the wide scope which exists for liberality in the financial support of these branches of research, which are of vital importance to the well-being of the Empire.

As regards requirements in the different parts of the Empire we venture to offer the following remarks, which summarise the close discussions which it has been our privilege to have with representative delegates :—

United Kingdom.—Requirements would be met by the establishment of (1) a research institute to deal with problems connected with the growing of forest crops, and (2) a research organisation which should include a central institute to deal with problems connected with the utilisation of forest products ; the former should also prove of indirect assistance to India and the Dominions and the Crown Colonies in connection with Education, and the latter of direct assistance to the various parts of the Empire and particularly to the Crown Colonies. The research organisation for forest products should be governed by a research board composed of official and non-official members and would be an executive body similar to the research boards established by the Department of Scientific and Industrial Research. The board should have allotted to it definite sums for research on forest products. It would be the duty of the board, after surveying the whole position, to decide where any particular problem should be investigated, and to distribute the funds at its disposal accordingly.

Australia.—We understand that the establishment of a combined forest products laboratory, for the whole Commonwealth has already received the preliminary approval of the State Governments. Wider investigations are urgently necessary in silvicultural and statistical research.

Canada.—Forest research problems in Canada are of great magnitude and importance owing to the vast forest resources of that Dominion and the necessity for working them on sound economic lines. We understand that useful research in the technology of wood has been carried out in the laboratories of the Dominion Forestry Branch, in co-operation with the McGill University, and that a wood-testing branch of that institution has been established in British Columbia. Important as this

branch of research is, however, we are strongly of opinion that investigations into such fundamental questions as seeding and regeneration, rate of growth and outturn of forest crops, are at present even more urgently required, and we consider that no time should be lost in undertaking this important work on a sufficient scale by provision of funds and appointment of trained investigators.

Indian Empire.—An organised Forest Research Institute has been in existence at Dehra Dun since 1906. We understand that provision has recently been made for a large increase to the buildings, equipment and staff of this institute, a measure which receives our cordial commendation.

South Africa.—The chief requirements are silvicultural research in respect both of indigenous forests and of plantations of exotic species, and statistical research in respect of the rate of growth and volume production of different trees and forest crops. Investigations into wood technology have already been started, and require further development.

East African Colonies.—The chief requirements are botanical, silvicultural research and utilisation, seasoning and preservation of timber.

West African Colonies and Protectorate.—The subjects demanding most urgent attention are (1) systematic botany, and (2) silvicultural research and investigations into rate of growth and outturn of forest crops; the former is urgent by reason of the fact that many species of trees are at present impossible to recognise owing to lack of means of identification. There is much scope also for investigations into questions of utilisation.

Trinidad.—The forest area is so small that silvicultural problems can be dealt with by the local staff. Any testing of timbers required can be carried out in the United Kingdom.

Newfoundland.—Provides a wide field for research into the utilisation of products other than timber. At present there is no organised forest service, but if and when such a service is started an essential portion of it will be a research branch for investigations into silvicultural questions and the rate of growth and volume production of forest crops.

British Guiana and British Honduras.—We regret the absence from the Conference of delegates from these Colonies, which possess considerable areas of forest.

New Zealand.—Forestry research in all its branches is of great importance in this Dominion.

Ceylon.—The chief problems requiring solution in Ceylon are those connected with silviculture, with the rate of growth and volume production of forest crops, and with the technology and utilisation of timber and other products. Problems connected with insects and fungi can at present be dealt with by the staff at Penradeniya.

Federated Malay States.—A beginning has been made with research into the technical properties of commercial timbers. Investigations into the rate of growth of forest crops have also been commenced. Further research work in these branches as well as systematic research into silvicultural problems are also required: we understand that the necessary staff has been applied for.

(Signed) R. S. TROUP,
Indian Forest Service.

D. K. S. GRANT,
Conservator of Forests,
Tanganyika Territory.

CLYDE LEAVITT,
Chief Forester, Commission of Conservation,
Ottawa.

C. E. LEGAT,
Chief Conservator of
Forests, South Africa.

H. R. MACKAY,
Commissioner of Forests,
Victoria.

R. L. ROBINSON,
Forestry Commissioner,
United Kingdom.

ANNEXURE C.

EDUCATION.

Report of the Committee appointed "to prepare a draft scheme of organisation of an Institution which would provide for the following:—

- (i) The training of forest officers for the United Kingdom.
- (ii) The training of forest officers from parts of the Empire having no place of higher training of their own.
- (iii) Refresher courses for forest officers from all parts of the Empire.
- (iv) Special courses, some of which would be held at the Institution and some at other schools of forestry of the Empire, with regard to which there would be interchange of students."

The Committee beg to report as follows:—

The need for a scientific in addition to a practical training in forestry has been recognised for many years.

It is to the credit of the Government of India that after training probationers in various Continental schools the first real steps

were taken in this country by instituting at the Cooper's Hill College in 1885 special courses of instruction for Indian forest probationers. A definite start was made, followed twenty years later, on the closure of the college, by the establishment of the Oxford University Forest School. Meanwhile other Universities had set on foot somewhat similar institutions, and eventually, about 1909, as a result of representations made by these Universities, the Indian forest probationers were divided among the Universities of Oxford, Cambridge, and Edinburgh, and this is the method in force at the present time.

While these systems have succeeded in training a number of very valuable forest officers, and have helped to arouse an interest in forestry, it is generally acknowledged throughout the forest services of the Empire that in the interests of Imperial forestry a central training institute and a great improvement in the standard of education is urgently required.

Our consideration of the whole matter must be influenced by the position taken up by the Government of India. The requirements of that service amount to about 40 per cent. of the whole of the officers likely to be trained in the near future, and in their view that training must take place in one single institution, to which must be admitted Europeans and Indians on equal terms.

It is of interest to note the many attempts which have been made by the Government of India to solve the difficult problem of forestry education. It is evident that they find little satisfaction in the present system, and are even now contemplating a transference of their whole training to a central institution in India. We are therefore impressed with the necessity of exercising the utmost care in dealing with this question in order to avoid the risk of another false start, which would certainly retard the success of education for a long period.

We accordingly, in the first instance, have to apply our minds to the consideration of the type of institution which would be best fitted for the needs of the whole Empire.

In the course of the discussion on education throughout the proceedings of the Conference, it has become clearly evident that the delegates are unanimously in favour of two main principles:—

1. That the training be carried out at one central institution.
2. That a necessary preliminary of this training be a complete University education.

But some differences of opinion have been found to exist in the minds of some of the delegates as to the relative advantages of this training taking place at a University and under its control, or at some place apart from and having no connection with a University.

Without in any way prejudging the case we proceed to consider these alternatives.

In considering the needs of forestry education it is important to have regard to the stage at which recruits for the forest services are selected. The opinion of the Conference is unanimously in favour of selection from the science schools of the Universities at the post-graduate stage. This denotes a definite stage in education at which point the work of selection by the Governments

concerned of the students most suitable for the service can be best achieved. Our proposals, therefore, are to superimpose forestry training upon a general scientific education.

Firstly, taking into consideration the feasibility of establishing the main centre of training at one of the Universities there are the following advantages. The capital cost of the buildings would be much less than if a separate institution were created, while the possibility of utilising the staff and equipment of the University would also lead to economy in another direction. In order to obtain the support of India, it might be possible to ask one of the colleges to earmark the necessary accommodation for Indian probationers, or the Government of India might even erect special buildings or rent a suitable house. As regards the first it would probably be difficult to secure at any college accommodation for men who have already finished their University education, while the third may have an element of economy in its favour; but these considerations refer entirely to our endeavours to fit in the requirements of the Government of India with those of the rest of the Empire.

It has been suggested that an argument in favour of this alternative may be based upon the opportunity which a student may have of shortening his course by carrying on his technical studies at the same time as he is reading for his science degree. Many of the Educational authorities we have consulted do not regard this idea with favour, because this combination may interfere with the attainment of the highest honours in pure science of which the student is capable. Moreover, it would imply selection prior to the definite stage in his general education upon which we lay so much stress.

There are, however, distinct disadvantages. It must be recognised that the forestry training is a preliminary to a technical occupation, and it is reasonable to expect that a probationer should devote as much of his time to the acquisition of his technical knowledge in forestry as if he entered any other profession or line of employment. The period of residence at some of the Universities amounts to little more than half the year, while the distractions of University life act as a serious bar to the employment of a technical student's time to best advantage. It has transpired in evidence that at some of the Universities there are difficulties and obstacles in the way of the development of technical and vocational work such as is required to prepare the forest probationer for his profession on the best practical lines, and forestry is of no value if it is not based on ample practical work in the laboratory, the workshop, and the field.

There is another serious objection to this scheme in the antipathy with which many men will regard their transfer from their own to another University. In establishing the centre at one University the circle of selection of candidates is therefore narrowed. In the interests of the recruitment of the best personnel, without placing any one University in a more advantageous position than its competitor, it would therefore appear that the selection of any one University has very grave drawbacks. It

is felt that all Universities should have equal chances in providing the material to be trained and that the association of the training centre with any one of them would defeat this end.

Another drawback is the impossibility of control by any outside body over any University. We regard it as essential for the proper conduct of our highly technical training that the controlling body should be one which is appointed for the purpose of forestry training alone, and which will be free to carry it on untrammelled by conflicting demands from competing branches of education. This body should be selected from qualified representatives of all the states or governments concerned, with the addition of such educational experts as may be found necessary.

It is largely in relation to the provision of special courses, which have been admitted to be essential, that the separation from true forest control would fail as it is only a body actively engaged and thoroughly posted up in the practice of forestry that could make this admittedly essential feature of the central institution really fulfil its purpose.

It is also considered that the expense to the student would be appreciably more at a residential University than at an independent institution.

Next we consider the alternative of a training institute apart from and unconnected with any University.

This course of training should be open to selected students who have taken an honours degree in pure or natural science at any recognised University.

This would give, it is felt, the widest possible field of selection, an equal chance would be given to the graduates of all Universities, and it would combine the advantages of a full University course with the opportunity of intensive training which can more easily be obtained at an institute unbound by the traditions of the older Universities. The importance of this consideration cannot be over-estimated.

It has been suggested on behalf of some of the Dominions that at the outset the qualification of a degree should not be applied too rigidly and that in certain exceptional cases it should not be exacted. We see no objection to this course for a term not exceeding five years, provided that full discretion is given to the governing body of the institution to refuse admission to such students if good reasons can be shown for doing so.

Any forecast of the number of students likely to attend the institution must be subject to revision, but on the estimates before us of present requirements the probable number of students will be about 50, and if a two-year course is adopted there would be not less than 100 in residence at one time, of whom 40 would be earmarked for the Indian forest service. This number should fully justify the establishment at the very commencement of a fully equipped institution, but it can scarcely be contemplated that even with the addition of students attending special or refresher courses there will be any justification for the maintenance of the highest class of forestry training at more than one centre

The United Kingdom, it may be stated generally, offers the best opportunities for a central institution—its propinquity to those forests in Europe which alone have been managed on scientific sylvicultural lines for several generations is of great importance now that in so many parts of the Empire the wild is beginning to give place to the cultivated forest and greater knowledge of proved intensive systems is required.

This central institute cannot, however, be expected to supply the training for the special needs of every part of the Empire. But it is anticipated that officers from some of the self-governing Dominions, while taking such instruction as they may require in the intensive systems referred to, will prefer to train for other special purposes within the borders of their own states.

The possibility of locating such an institute in or near forests which are under the control of the State, would facilitate instruction and research, and would be of very definite importance during the periods allotted to practical work.

The course of training would extend over a period of at least two years, and scholarships tenable for that time should be offered to all selected candidates by their respective Governments. The training would include theoretical work, at least six months' practical working in the forests, and one or more visits to study the systems of management in continental forests.

In addition to those students who take a full course of training or those who take up a subject for special study, it is recognised that it would be of real advantage that the institute should always be open to officers of the forestry services, whatever their standing may be, who desire to take a course in general or selected subjects on their own account.

It is believed that the Conference will readily agree as to the importance of such refresher courses, but we draw very special attention to them, as we believe them to be among the most useful features of the work of the institute, and that the different forest services of the Empire will gain very greatly if their Governments in regular course attach their officers on full pay to the institute, or to centres of training in other parts of the Empire for the purpose of these courses.

It is recommended that the staff of such an institute would consist of the Principal, who would be a forest officer selected for his experience in administrative work, and one professor of forestry who would be assisted by an adequate staff of lecturers and specialists in the various subjects.

There appears to be some considerable advantage in associating with the training at the institute the duty of research into the production, formation, tending and protection of forests, and if this proposal is adopted the specialists included in our staff might, without interfering with their primary duties, devote a portion of their time to educational work in their own subjects.

The cost of a building in which to house and train 100 students will be a very serious one. Contributions, except as noted below, towards the capital cost and of the annual maintenance may be anticipated from all the Governments interested; the interest of

India is so large and the interest of the United Kingdom and the Colonies individually so small, that in our opinion the scheme cannot be carried out without material assistance from the Indian Government.

The self-governing Dominions, and Provinces and States who generally possess training institutions of their own, cannot be expected to contribute to the capital cost, though they will no doubt be desirous of paying so much of the annual cost as may be fairly applicable to the full or special courses to which their own students may be sent.

This institution which now has been outlined does not cover the whole ground; in the United Kingdom the Forestry Commission have a very distinct responsibility for training not only the officers for their own service, but a responsibility for giving opportunities for training to owners and managers of those private woodlands which will perhaps always form the bulk of the woodland area in the United Kingdom. This may clearly be a shorter and less specialised course of training than that proposed for the forest services, and it is hoped to enlist the sympathies of the Universities in the establishment of special courses in forestry or as a section of their agricultural and estate department. It is believed that there would be a great demand for such courses and that the Commission should offer assistance in carrying them on.

A third course has been suggested to us by the Professor at Edinburgh University which we think it is our duty also to examine. Professor Stebbing considers that selection for the different forest services should be made from men who have a degree in forestry of selected Universities; that they should be further trained at a separate institution in advanced courses, and also along those lines which are considered necessary or advisable for the special purposes of the country concerned. It therefore would combine in a way the two methods which we have already discussed. It has, in our opinion, several patent disadvantages. In the first place it does not admit of selection at a definite stage of education, so that the general standard of education, prior to training, would ordinarily be much below that which we consider essential. Secondly, it is a tacit admission that existing courses are capable of extension with advantage; but lastly, we are of opinion that if special courses dealing with local conditions are necessary at all, such courses, in so far as familiarisation with local problems are concerned, should be held in the country to which they apply. We do not, of course, refer to specialised study of specific subjects which would ordinarily be confined to a few selected students or to forest officers who want to refresh or expand their general or special knowledge, but we feel that it would be quite impossible to provide such instruction unless those special courses were taken at a fully equipped central institution organised on the lines which we have already recommended. There is also the consideration that a student who has obtained a degree which marked the completion of his technical education in forestry would perhaps be less willing to accept further instruction in subjects which he would not unnaturally consider himself

fully qualified in. This would also involve considerable expenditure at each centre of instruction, together with a further cost, and actually not less than is anticipated for the single self-contained institution which we have discussed.

Having now set out three schemes which satisfy the conditions we have laid down of one central institution for forestry training combined with the advantages of a complete University education, and having discussed them formally and informally with most of the delegates and many of the associate delegates, the Committee have arrived at the conclusion that a separate institute unconnected with any Universities is the ideal system of training in Forestry.

But we are bound to recognise and to impress upon the Conference that owing to its cost it can only be carried out as we have designed it with the fullest support of India and the Colonies.

While we feel that the decision at which we have arrived unanimously is the one we desire to press very strongly upon the Conference, we admit that differences of opinion upon the important point of the actual relationship between the Universities and the training institute are certain to exist, and we believe that the matter is of so great importance that it should form a proper subject of discussion by a Committee to be appointed without undue delay.

We have endeavoured to arrive at an ideal scheme which will satisfy the clearly expressed desire of the Conference to place at the disposal of all the forestry services the best possible method of education.

Keeping in view the vast interests at stake, it is hoped that the Conference will judge these schemes on their merits alone, and in arriving at a decision will not give undue weight to financial considerations.

(Signed) CLINTON,

Forestry Commissioner, United
Kingdom.

E. BATTISCOMBE,

Conservator of Forests, East
African Protectorate.

AVILO BÉDARD,

Assistant Chief Forester, Provincial
Forest Service, Quebec.

C. E. LEGAT,

Chief Conservator of Forests,
South Africa.

H. R. MACKAY,

Commissioner of Forests, Victoria.

W. F. PERREE,

President, Imperial Forest Research
Institute, Dehra Dun.

ANNEXURE D.

IMPERIAL FORESTRY BUREAU.

Report of the Committee appointed "to prepare a draft of the objects, constitution, powers, duties, and methods of finance of an Imperial Forestry Bureau for presentation to the Conference not later than July 20th, particular regard being had to the importance of avoiding overlapping with existing institutions."

The Committee beg to report as follows :—

1. As a guide in the preparation of our report we have had before us the Charter of Incorporation and Annual Report of the Imperial Mineral Resources Bureau, and also a draft charter of an Imperial Agricultural Bureau. Copies of these documents* are appended to our report. Two of our members have also interviewed Sir Richard Redmayne, Chairman of the Board of Governors of the Imperial Mineral Resources Bureau, who explained to them the objects, organisation and work of that Bureau. Sir Frank Heath, Secretary to the Department of Scientific and Industrial Research, has also been good enough to give his views on the subject. It may be added that both gentlemen warmly supported the idea of setting up an Imperial Forestry Bureau, and expressed the opinion that such a Bureau would be of great use to the Empire.

2. We are of opinion that the general constitution adopted for the Imperial Mineral Resources Bureau (which is similar in construction to that proposed for an Imperial Agricultural Bureau) is suitable for a Forestry Bureau. Timber and forest products generally differ from minerals, in that they are produced by biological agencies and that their production can be continued indefinitely provided suitable steps are taken to ensure reproduction and growth; minerals on the other hand are a wasting asset. Forestry differs also from agriculture in the important respect that the State is frequently the largest owner of forest within its own boundaries, whereas agriculture is normally a matter for individual enterprise. The State, therefore, has at least a double interest in forestry—in stimulating production generally and in developing its forest estate to the best advantage—and generally a third interest as a large consumer of timber on works of public utility. These differences, while furnishing additional reasons for setting up a Forestry Bureau under official auspices, have also to receive recognition in defining the scope of the Forestry Bureau.

3. Following the precedent of the Imperial Mineral Resources Bureau, the Forestry Bureau should be incorporated by Royal Charter. We have not attempted to draft a charter in detail as we consider that that is a matter for legal experts. We have

* Not printed.

set out below, however, for the guidance of the Conference the main points which it is desirable to incorporate in the charter.

4. We have received unofficially a suggestion that the Forestry Bureau might form part of the proposed Imperial Agricultural Bureau. We recommend that this suggestion be not adopted. It is the common experience in all parts of the Empire that agricultural questions are of such immediate urgency and appeal to such wide classes of the community that the interests of forestry are frequently overlooked by an organisation dealing both with agriculture and forestry.

We consider that owing to the backward state of forestry it is essential to have a separate Bureau.

OBJECTS OF THE FORESTRY BUREAU.

5. We suggest that the objects of the Bureau be defined as follows :—

(1) To collect, co-ordinate and disseminate information as to—

(a) Forest education, research, policy and administration; the constitution, organisation and management of forests; and matters arising out of or incidental to the growing of timber and other forest products;

(b) The resources, utilisation, consumption and requirements of timber and other forest products.

(2) To ascertain the scope of existing agencies with a view to avoiding unnecessary overlapping.

(3) To devise means whereby existing agencies can, if necessary, be assisted and improved in the accomplishment of their respective tasks.

(4) To supplement these agencies, if necessary, in order to obtain any information not now collected which may be required for the purposes of the Bureau.

(5) To advise on the development of the forest resources of the Empire or of particular parts thereof, in order that such resources may be made available for the purposes of Imperial defence or of industry or of commerce.

POWERS OF THE BUREAU.

6. The Bureau should be empowered :—

(i) To hold personal or movable property, a limited area of land within or without the Empire, and real estate if gifted to it for the purpose of meeting part or all of its expenses.

(ii) To employ and pay such officers, servants, &c. as may be necessary to carry out the work of the Bureau.

- (iii) To enter into contracts and arrangements both in the Empire and elsewhere.
- (iv) Generally to do anything not expressly provided for, but which is incidental or conducive to the exercise of any of the powers of the Bureau.

CONSTITUTION.

7. We recommend that the powers of the Bureau be vested in the Governors, of whom the President should be the Lord President of the Council for the time being. The Governors should be as follows :—

The person appointed by the Lord President as representative of the United Kingdom; such further persons as may from time to time respectively be appointed by the Government of the Dominion of Canada, the Government of the Commonwealth of Australia, the Government of the Dominion of New Zealand, the Government of the Union of South Africa, the Government of Newfoundland, the Government of India, and the Secretary of State for the Colonies; and such further six persons as may from time to time be appointed for that purpose by the Lord President of the Council together with the Director for the time being.

8. Each of the Governors other than the Chairman should hold office for a year and be eligible for re-appointment. The Chairman and the Director should be appointed for a period of five years and be eligible for re-appointment.

9. The Chairman of the Bureau should be appointed by the Lord President of the Council.

10. There should be appointed a Director of the Bureau who would be the executive head of the Bureau. The appointment should rest with the Lord President of the Council after consultation with the Governors, and the Director should receive from the funds of the Bureau such remuneration as may be fixed by the Governors.

11. The Governors may from time to time appoint Advisory Committees the members of which should hold their office during the pleasure of the Governors.

12. The Governors may also constitute and maintain agencies in any part of the Empire or in any foreign States.

DUTIES OF THE BUREAU.

13. The duties of the Bureau may be summed up briefly as the achievement of the objects which are stated in paragraph 5 above. In addition it should be the duty of the Director to prepare an annual statement of the work of the Bureau, which on the approval of the Governors should be submitted to the Lord President of the Council, copies thereof being transmitted for information to the Governments of all parts of the Empire.

METHODS OF FINANCE.

14. It will be necessary for the Bureau to rely mainly on the Governments of the Empire to provide the funds necessary for the conduct of its business, but it should be empowered also to hold and administer as well other money which it may receive as gifts or fees.

As to the basis on which the different Governments should contribute, it has been ascertained from the Chairman of the Imperial Minerals Resources Bureau that no definite basis could be found, and that the Bureau has fallen back on voluntary contributions. We considered that a fair basis would be as follows :—

The United Kingdom 25 per cent. of the annual expense.

British India 25 per cent.

The Self-Governing Dominions 25 per cent.

The Crown Colonies and Protectorates 25 per cent.

The total sum required will be not less than 10,000*l.* per annum during the first five years of the Bureau's existence.

15. The accounts of the Bureau should be audited annually, presented by the Chairman when approved by the Governors to the Lord President of the Council, and transmitted for information to the Governments of all parts of the Empire.

16. Since there must necessarily be a stage prior to the actual formation of the Bureau, during which much spade work will have to be done, we recommend that application be made for a grant of 5,000*l.* from the Imperial Treasury and that the Forestry Commission be requested to administer that grant and to take the steps necessary for bringing the Bureau into being.

OVERLAPPING WITH OTHER INSTITUTIONS.

17. We suggest that it will be found in practice that the rôle of the Bureau will be not so much to do work in different parts of the Empire as to get work done. We have not been able, in the time at our disposal, to ascertain precisely to what extent existing institutions in the United Kingdom and other parts of the Empire are attempting to meet any of the objects of the Bureau, but we do know definitely that the objects as a whole are not in any way met. The important subjects with which the Bureau would deal are in a chaotic state and the constitution of a collating and stimulating organisation for the whole Empire is urgent.

However, in order to meet any possible duplication it is expressly set out above under the heading "Objects of the Forestry Bureau" (paragraph 5 (2), (3) and (4) that the Bureau

is to ascertain the amount of overlapping which may prevail, to devise means for assisting and improving existing agencies and for supplementing existing agencies to obtain new and necessary information.

(Signed) R. L. ROBINSON,

Forestry Commissioner, United
Kingdom.

P. H. CLUTTERBUCK,

Chief Conservator of Forests,
India.

G. E. CUBITT,

Conservator of Forests, Federated
Malay States and Straits
Settlements.

D. JAMES DAVIES,

Newfoundland.

C. LEGAT,

Chief Conservator of Forests,
Union of South Africa.

H. MACKAY,

Commissioner of Forests,
Victoria.

SUMMARY OF STATEMENTS PRESENTED TO THE CONFERENCE.

The Forestry Commission of the United Kingdom in issuing invitations in November, 1919, to the different parts of the Empire to be represented at a British Empire Forestry Conference in London during July, 1920, forwarded at the same time a request that a statement might be prepared as to the forests and forestry in individual parts of the Empire. In order to secure a measure of uniformity in the preparation of the individual statements, a skeleton or outline was issued which ran as follows :—

OUTLINE OF STATEMENT.

1. General description of the Country from the forestry point of view, indicating the salient features as regards topography, geology, soils, and climate. (Not exceeding three pages*.)

2. Description of main types of forest growth, indicating the composition, by species, of the types, the general distribution of the types, and the general growth conditions determining distribution. (Not exceeding three pages.)

3. Area covered by existing forests. Areas and percentages of total country under (a) merchantable forest, (b) scrub or other forest growth at present unprofitable or inaccessible.

(The text should take the form of any short explanatory notes that may be necessary to Table I. below.)

4. Brief notes on the most important timbers and other forest products. (Not exceeding three pages.)

5. Ownership of forests :—Area of forest belonging to the State, area under ownership or control of municipal or other corporate bodies, and area privately owned. (The text should take the form of a short explanatory statement of Table II.)

6. The relationship of the State to the Forests. (Not exceeding three pages.)

A. Brief summary of existing legislation.

B. Brief summary of direct administrative methods of forest development, *e.g.*, fire protection, planting of waste areas, regeneration of natural forest.

C. Brief summary of assistance given to forestry, *e.g.*, provision of nursery stock, expert advice, grants to societies, etc., remission of taxation.

7. The Forest Authority (" Department " or " Branch ") organisation, powers and duties, income and expenditure (showing main branches only), recruitment and training of superior and subordinate staffs, publications and reports. (Not exceeding three pages.)

8. Forestry activities of municipal and corporate bodies, private companies and private individuals. (Not exceeding one and a half pages.)

* Printed pages, foolscap size (13½ in. × 8½ in.).

9. Professional and other societies interested in Forestry and the utilisation of forest products, their aims and objects, periodical and miscellaneous publications issued, postal and telegraphic addresses. (Not exceeding one and a half pages.)

10. Education, Research and Experimental work. Places of instruction in forestry, nature and duration of courses provided, nature of research (laboratory) work and of experimental (field) work carried out. (Not exceeding three pages.)

11. Annual increment and utilisation of home-grown timber.

Notes.—1. By “gross increment” is meant the total amount of timber produced in the forest; by “net increment” the gross increment less losses by fire, decay, etc. By “utilisation” is meant the amount of timber cut and brought into use.

2. For the sake of simplicity no reference is made to forest products other than timber. If necessary short mention of them may be made in the text.

A. Increment.—Estimated total annual increment of timber, showing proportion produced from forests under State control. Estimated waste by fire, etc., and by over-maturity (decay).

(The text should take the form of a short explanatory statement of Table III.)

B. Utilisation.—Annual utilisation for home consumption or export, showing proportion produced from forests under State control.

(The text should take the form of a short explanatory statement of Table IV.)

12. Forest industries, statistics of volume of timber, etc., consumed and of value of product and of number of persons directly employed in main forest industries, *e.g.*, lumbering, pulping, wood distillation.

(The text should take the form of any necessary short explanatory statement of Table V.)

13. Statistics as to exports and imports of timber.

A. Exports.—Volume and value of timber, by species if possible, exported overseas or to foreign countries and to adjoining States (showing, if possible, changes over a series of years).

B. Imports.—As for (A) above.

(The text should take the form of any necessary explanatory statement of Table VI.)

Notes.—1. A further table dividing the imports according to their sources and exports according to their destination should be added if possible.

2. For the sake of simplicity no reference is made to forest products other than timber. If necessary short mention of them may be made in the text.

14. *Summary and Outlook.*

- A. The total home consumption of home-grown and imported timber compared with the total increment.

(The text should take the form of a short explanatory statement, if required, of Table VII.)

- B. Probable duration of supplies at normal rates of cutting and of growth.

- C. Short summary of steps which should be taken to protect and develop the forest resources of the country.

APPENDICES.

- A. List of Reports of Commissions and Committees reporting on forestry and forest questions.
 B. List of legislative enactments dealing with the above questions.
 C. List of publications issued by or under the supervision of the Forest Authority.
 D. List of other periodical and miscellaneous literature bearing on forestry.
-

The Tables referred to in the above outline of statement are set out subsequently.

In spite of the shortness of the notice which most of the Governments received, the response was most gratifying, and 33 statements were presented to the Conference, viz., for :—

The United Kingdom.

British India.

The Dominion of Canada as a whole.

Two of the Canadian Provinces, viz. :—

British Columbia.

Quebec.

Five of the six Australian States, viz. :—

New South Wales.

Victoria.

Queensland.

South Australia.

Western Australia.

The Union of South Africa.

The Dominion of New Zealand.

The Dominion of Newfoundland.

Seven African Colonies and Protectorates, viz. :—

Nigeria.

Gold Coast.

Nyasaland.

Swaziland.

Uganda.

British East Africa.

Southern Rhodesia.

Thirteen other British Possessions, viz. :--

Malay Peninsula.
 Trinidad.
 Cyprus.
 The Bahamas.
 British Guiana.
 Bermuda.
 British Honduras.
 Jamaica.
 Seychelles.
 Windward Islands.
 Leeward Islands.
 Weihaiwei.
 Hong Kong.

In order to avoid tiresome repetition in the following brief summary it is necessary to point out that, owing to the imperfect state of knowledge as to the forests in various parts of the Empire, much of the data are put forward in the Statements with reservations which it is impossible to enter into. *This fact must be borne in mind throughout.*

It will be observed also that the statements do not cover the whole of the Empire. Certain extensive forest areas, for example, British North Borneo, are omitted. Ceylon* and Sierra Leone submitted no statements but sent delegates to the Conference, and the information thus brought to light in the proceedings is entered in italics in the tables below.

1. GENERAL DESCRIPTION FROM THE FORESTRY POINT OF VIEW

The Empire contains within its boundaries practically all the ranges and combinations of conditions which affect tree growth on this planet.

Distribution and type of forest appear to depend chiefly on temperature and moisture conditions. Temperature makes its effect felt for example in the Arctic regions (Canada) and the high mountains (*e.g.*, Himalayas) which are treeless; lack of moisture is the chief factor in inhibiting economic forest growth over great areas in Africa, Australia and British India.

2. DESCRIPTION OF THE MAIN TYPES OF FOREST GROWTH, INDICATING THE COMPOSITION, BY SPECIES, OF THE TYPES, THE GENERAL DISTRIBUTION OF THESE TYPES, AND THE GENERAL GROWTH CONDITIONS DETERMINING DISTRIBUTION.

For convenience the information supplied under this head is set out in tabular form. Distinguishing two main types of forest—conifers and broadleaved—the great bulk of the conifers are in Canada with substantial areas in the Himalayas, smaller areas on the N.E. coast of Australia and New Zealand, and relatively small and scattered blocks through Africa, the West Indies, etc. Of the broadleaved forests, excepting the Eucalyptus forests of Australia, the greater part are tropical or sub-tropical in character.

* Statement since received.

Main types.	Composition by species.	General Distribution of types.	General Growth Conditions.
UNITED KINGDOM.			
1. Broadleaved high forest...	Oak, <i>Quercus Robur</i> ; Beech, <i>Fagus sylvatica</i> .	S. and S.W. of England. Chiltern Hills.	Heavy soils; Chalk.
2. Coppice ...	Oak, <i>Quercus Robur</i> ; Chestnut, <i>Castanea vesca</i> ; Ash (<i>F. excelsior</i>).	S. and S.W. counties ...	Heavy soils, old oak forests.
3. Mixed Conifer, broad-leaved.	Oak, <i>Quercus Robur</i> ; Scots pine, <i>P. sylvestris</i> ; Larch, <i>L. europæa</i> .	Midlands and S. and W. ...	Old woodland areas.
4. Conifers ...	Scots pine ...	General. Indigenous in Scotland	Sandy soils, S. and E. coast.
	Larch, Spruce (<i>P. excelsa</i>) and various exotics.	General ...	Replacing old hardwoods.
BRITISH INDIA.			
1. Evergreen ...	Numerous spp., e.g., <i>Calophyllum Elagnia</i> , <i>Ficus</i> , <i>Garcinia</i> , <i>Mangifera</i> , <i>Messua</i> .	W. Coast, Assam, Burma, Andaman Islands, E. Bengal.	Tropical. Even high temperature. High rainfall and relative humidity.
2. Deciduous ...	Numerous spp., e.g., Teak, <i>Tectona grandis</i> ; Sal, <i>Shorea robusta</i> ; <i>Chloroxylon Pterocarpus</i> .	Common type in remainder of Peninsula, Burma, Sub-Himalayan district and Gangetic plain.	Rainfall 40"-70". Mean temperature approximately 80°F.
3. Dry ...	Bombay, <i>Butea</i> , <i>Acacia</i> and others ...	Punjab, W. Rajputana and Sind	Average rainfall 15". Temperature 25°-125° F.
4. Hill ...	<i>Pinus longifolia</i> ; <i>Pinus excelsa</i> ; Deodar, <i>Cedrus deodara</i> ; <i>Abies Webbiana</i> ; <i>Quercus</i> , spp.	Himalaya, &c. ...	Rainfall generally exceeds 40". High relative humidity.
5. Tidal ...	Mangrove, e.g., <i>Rhizophora</i> , <i>Bruguiera</i> , <i>Heritiera tomes</i> , &c.	Sundarbans, Andamans, Burma Coast.	Between high and low water.
6. Riparian ...	<i>Acacia arabica</i> ; <i>Dalbergia Sissoo</i> ; <i>Lagerstroemia Flos Regine</i> ; <i>Tamarix</i> .	R. Indus and tributaries, Ganges, &c.	Abundant ground moisture by percolation.

Main types.	Composition by species.	General Distribution of types.	General Growth Conditions.
CANADA.			
I. <i>Pacific Forests</i> ...	Predominantly coniferous ...	Mainly West of Rocky Mountains	
1. Coast type ...	Douglas fir (<i>Pseudotsuga Douglasii</i>) 28 per cent; Red cedar (<i>Thuja pliocata</i>) 28 per cent.; hemlock (<i>Tsuga heterophylla</i>) 25 per cent.; Sitka spruce and others.	Vancouver Island, Queen Charlotte Islands and opposite coast of mainland.	Moderate temperature and heavy rainfall.
2. Interior Dry Belt ...	Western yellow pine (<i>P. ponderosa</i>), Douglas fir; Western larch (<i>L. occidentalis</i>).	Plateau and minor mountain ranges East of the Coast mountains.	Dry well-drained soils 1,500-2,500 ft. elevation. 14"-25" rainfall.
3. Interior Wet Belt ...	Western cedar, hemlock and Engelmann spruce (<i>P. Engelmanni</i>). To the South Engelmann and White spruce (<i>P. Canadensis</i>) and Lodgepole pine (<i>P. contorta</i>) and others. To N. Engelmann spruce and Alpine fir (<i>A. lasiocarpa</i>). Chiefly coniferous but with certain regions of broadleaved species.	Rocky Mountain system ... <i>Note</i> .—The spruce-fir-lodgepole pine sub-type of the N. extends across the Rockies into the foothills of Alberta.	Rainfall 20"-60".
II. <i>Atlantic Forests</i> ...		Roughly from the Eastern Rockies to the Atlantic coast and New foundland.	Northern climate, heavily glaciated country with numerous lakes and swamps.
1. The Northern Forests...	White spruce, the most important species with Black spruce (<i>P. mariana</i>), Jack pine (<i>P. Banksiana</i>), balsam fir (<i>A. balsamea</i>), Aspen (<i>P. tremuloides</i>) and Poplar (<i>P. balsamifera</i>) and tamarack (<i>L. laricina</i>), as associates according to local conditions.	Northern Prairie Provinces, northward to a line joining the mouths of the Mackenzie and Churchill Rivers, the Hudson Bay and the Labrador Peninsula excepting the N.E. corner.	Climatic conditions severe, improving from the Arctic limit of tree growth southwards.
2. The Eastern Forests ... (Several types not very clearly differentiated.)	To the South and East as conditions improve the other components of the growth, and in a mixture of White spruce and Balsam fir form the great pulp-wood resources of Eastern Canada extending along the shore of the Gulf of St. Lawrence to Newfoundland.		(Northern Forest) type improve in wood resources of Eastern Canada

South of the height of land this type changes as it enters the St. Lawrence basin with the inclusion of White pine (*P. strobus*), Red pine (*P. resinosa*) and cedar (*Thuja occidentalis*), and the more valuable hardwoods such as Yellow birch (*B. lutea*), Maple (*Acer spp.*). In the Maritime Provinces, and Quebec the Red spruce (*P. rubra*) is found as a component of the coniferous forests of this type. This is the most important timber-producing region of Eastern Canada.

The older part of Ontario, where the soil and climatic conditions are unusually favourable was originally an almost pure hardwood forest: Tulip (*Liriodendron tulipifera*), Oak (*Quercus spp.*) Hickory (*Carya spp.*) &c. These forests have largely disappeared to make way for agriculture.

NEWFOUNDLAND.

White spruce, Balsam fir (*Abies balsamea*). | Valleys of large rivers and banks of lakes.

AUSTRALIA.

1. Softwood Forests— (a) Araucaria type	...	Hoop and Bunya pines (<i>Araucaria Cunninghamii</i> and <i>Bidwillii</i>), associated with <i>Flindersia spp.</i> and others.	Queensland and Northern New South Wales.	High rainfall (30"-100") fringing the coast.
(b) Jungle or Brush	...	Numerous spp., e.g., <i>Flindersia</i> , <i>Agathis</i> , <i>Cryptocarya</i> .	Queensland and Northern New South Wales.	Generally similar but moister conditions than 1(a).
(c) Cypress pine...	...	<i>Callitris spp.</i>	W. of coastal ranges, Queensland, New South Wales.	Rainfall 15"-30".
2. Hardwood Forests	...	Predominantly Eucalyptus. Very numerous spp. adaptable to wide ranges of conditions.	Chiefly coastal ranges of E. Australia, S. Australia and S.W. of West Australia.	Rainfall appears to be limiting factor.
3. Scrub ...	...	Various Eucalyptus (<i>Mallee</i>) and Acacias (<i>Mulga</i>).	Chiefly away from coastal ranges	Scanty rainfall.

SOUTH AFRICA.

(Plantations omitted).

1. Forest ...	...	<i>Podocarpus spp.</i> and various hardwoods, e.g., Sneeze-wood (<i>Platanocylon utile</i>).	Flanks of mountains facing the Ocean.	Sufficiency of moisture
2. Scrub ...	...	<i>Proteaaceae</i> , <i>Ericaceae</i> and others.	South-western coast region of the Cape.	A region of winter rains and hot dry summers.
3. Bushveld ...	...	<i>Acacia spp.</i> and others ...	(a) S.W. African Protectorate. (b) Basin of the Limpopo and its tributaries.	—
4. Palm Belt	...	<i>Phoenix reclinata</i> , <i>Hyphene crinita</i> and others.	Littoral belt from East London northwards.	—

Main types.	Composition by species.	General Distribution of types.	General Growth Conditions.
NIGERIA.			
1. Littoral Forests—			
(a) Fringing Forests ...	Similar to 2 ...	Vicinity of streams ...	Moist situation.
(b) Freshwater Swamp Forests.	<i>Lophira procera</i> , <i>Mitragyna macrophylla</i> and others.	Near the coast and along rivers.	Permanently wet soil.
(c) Mangrove Forests ...	<i>Rhizophora</i> spp., <i>Avicennia</i> ...	Along coast generally ...	Between high and low water mark.
2. Tropical Evergreen Forests.	Mahoganies (<i>Klages</i> , <i>Entandrophragmas</i>) <i>Chlorophora excelsa</i> and many others.	Belt 50-100 miles wide from coast.	High rainfall and tropical conditions.
3. Mixed Deciduous Forest	Species very numerous, e.g., <i>Mormosa lauriflora</i> , <i>Terminalia superba</i> .	Generally inland from 2 ...	Well marked dry season.
4. Savannah Forest ...	Numerous species, e.g., <i>Klages senegalensis</i> , <i>Pseudocedrella Kotschy</i> .	Inland ...	Hot dry winds, alternately with swampy conditions.
5. Thorn Forest ...	Acacias, e.g., <i>A. rerck</i> , <i>A. segal</i> ...	Northern part of country ...	Dry.
GOLD COAST.			
(Generally similar to Nigeria).			
BRITISH EAST AFRICA.			
(a) Mangrove Swamps ...	<i>Rhizophora</i> , <i>Bruguiera</i> , etc.	Creeks and inlets of the coast ...	Between high and low water mark.
(b) Coast Forests ...	<i>Azadirachta indica</i> and others ...	Coastal belt ...	Under influence of the moisture-laden winds from sea.
(c) Nyika Forest ...	Thorn bush, <i>Acacia</i> , spp. and others ...	Vast areas between coast and highlands.	Waterless arid country.
(d) Plains Forests ...	<i>Brachylaena Hutchinsii</i> , <i>Croton Elliotianus</i> and others.	Below the main mountain forests at 5,000-6,500.	Limited to laterite soil.
(e) Mountain Forests—			
(a) Muzaiti ...	Numerous species, <i>Olea Usambarensis</i> (Muzaiti).	{ Mts. Kenya and Elgon, Slopes of Aberdare Mountains, &c. }	(a) Heavy rainfall.
(b) Cedar Forests ...	<i>Juniperus procera</i> , <i>Podocarpus</i> spp. ...		(b) Subject to periodic dry weather conditions.

No classification by types.			
	<i>Podocarpus</i> spp. <i>Juniperus procera</i> <i>Eutendrophragma</i> spp. <i>Khaya</i> spp.	... | Rewenzori and Mt. Elgon ... | Vicinity of Lake Victoria	... } Forests have not yet been thoroughly explored.
NYASALAND.			
1. Coniferous	... <i>Widdringtonia Whytei</i> ...	... | Manje mountain, 4,000-7,000 ft.	Gullies and ravines. Rainfall 50"-85".
2. Broadleaved	... <i>Khaya senegalensis</i>...	... | Vicinity of streams, 1,000-4,000 ft. elevation.	—
3. Scrub	... <i>Usupaca Kirkiana</i> , <i>Brachystegia</i> spp., <i>Acacia</i> spp. and others.	... | General throughout the country ...	—
SWAZILAND.			
List of useful trees includes <i>Sideroxylon inerme</i> , <i>Curtisia fuginea</i> and others.			
SOUTHERN RHODESIA.			
1. High Forest	Two sub-types:— (a) with <i>Khaya nyasica</i> . (b) with <i>Cassania umbellifera</i> and <i>Eugenia</i> spp.	... | Narrow mountain range on Eastern border.	Annual rainfall 50"-80".
2. Savannah	Very numerous species, e.g., <i>Baikia plurijuga</i> , <i>Copaifera mopani</i> , <i>Brachystegia</i> spp.	... | Greater part of the country	—
MALAY PENINSULA.			
1. Littoral— (a) Mangrove Swamp (b) Dry	<i>Rhizophora</i> spp., <i>Bruguiera</i> spp. ... <i>Casuarina equisetifolia</i> , <i>Hibiscus</i> , <i>Pongamia</i> and others.	... | Along the sea coast	{ Between high and low water mark. Above high water mark.
2. Inland— (a) Freshwater Swamps (b) Lowland (c) Hill	<i>Pandanus</i> spp., <i>Zalacca</i> spp. and others ... 50 per cent. <i>Dipterocarps</i> , Complex flora ... <i>Agathis</i> spp., <i>Dacrydium</i> , <i>Podocarpus</i> ...	... | Water-logged soil, 4-5 ft. of peat. Up to 2,000 ft. elevation ... Hilly country ...	{ — Warm equable moist climate. —

Main types.	Composition by species.	General Distribution of types.	(General Growth Conditions.
CYPRUS.			
1. Coniferous	<i>Pinus halepensis</i> , <i>Pinus nigra</i> var. <i>laricio</i> , <i>Cedrus libani</i> .	Mountainous country generally ...	—
2. Broadleaved	<i>Platanus</i> , <i>Quercus</i> spp.	Fairly wide distribution	—
BRITISH GUIANA.			
A. Easily accessible— 1. Swamp Forest. Several sub-types.	<i>Rhizophora</i> , <i>Avicennia</i> , Crabwood, <i>Carapa guianensis</i> ; Wallaba, <i>Eperua</i> spp.; <i>Mora caribaea</i> ; and numerous other species.	Low-lying country	Type varies with nature (salt or freshwater) of inundation.
2. Hill country. Several sub-types. Forests known by name of ruling species, e.g., (Greenheart, Wallaba and Balata Forests.	Greenheart, <i>Nectandra Rodiei</i> ; Wallaba, <i>Eperua</i> spp.; Balata, <i>Mimusops</i> spp. and others.	Chief commercial forests of the easily accessible area.	Soil the most important factor in determining type.
B. Not easily accessible— Two sub-types, classification not complete.	<i>Mora</i> ; Greenheart; <i>Cedrela odorata</i> , and others.	Hinterland or mountainous country lying W. and S. of the easily accessible area.	—

No classification by types has been made, and it is impossible to construct them from the evidence in the Statements in the cases of New Zealand, British Honduras, Jamaica, Bahamas, Bermuda, Hong Kong and Weihaiwei. The most important of the species referred to are given, however, in the section dealing with timbers.

3. AREA COVERED BY EXISTING FORESTS, AREAS AND PERCENTAGES OF TOTAL COUNTRY UNDER (a) MERCHANTABLE FOREST, (b) SCRUB OR OTHER FOREST GROWTH AT PRESENT UNPROFITABLE OR INACCESSIBLE.

The areas in Table I. are rounded off to the nearest 10 sq. miles; those for British India and New Zealand represent State forest only.

The total land area accounted for is 9,160,220 sq. miles, of which 1,837,160 sq. miles (20 per cent.) is forest and 1,570,030 sq. miles (17 per cent.) agricultural land. Of the 1,837,160 sq. miles of forest, 1,797,160 sq. miles have been further sub-divided into 685,130 sq. miles (38 per cent.) merchantable and 1,112,030 sq. miles (62 per cent.) unprofitable or inaccessible.

TABLE I.
Area of Forest
(square miles).

Country.	Agri- cultural land.	Forest.			Other land.	Total land area.
		Merchant- able.	Unprofitable or inaccessible.	Total.		
United Kingdom	97,080	3,860	1,320	5,180	17,210	119,470
British India	431,900	126,310	125,160	251,470	407,430	1,090,800
Canada (as a whole)	689,060	390,630	541,790	932,420	2,108,190	3,729,670
British Columbia	15,700	—	—	149,300	188,000	353,000
Quebec	40,000	203,490	312,130	515,620	135,240	690,860
Australia—						
Queensland	15,000	10,000	50,000	60,000	595,500	670,500
New South Wales	—	17,190	—	17,190	292,270	309,460
Victoria	43,750	4,690	7,810	12,500	31,630	87,880
South Australia	—	250	—	6,000	—	380,070
West Australia	71,830	4,770	21,000	25,770	878,320	975,920
Tasmania	—	940	—	17,200	—	26,210
New Zealand	27,520	2,140	14,230	16,370	59,690	103,580
South Africa (Union of)	20,930	—	—	2,360	449,810	473,100
Newfoundland	—	—	—	10,000	—	42,000
British East Africa	47,170	3,600	1,500	5,100	192,790	245,060
Southern Rhodesia	2,210	18,300	73,200	91,500	58,790	152,500
Nyasaland	—	—	—	3,000	—	43,610
Swaziland	—	Practically nil.			—	6,500
Uganda	—	—	—	1,200	—	92,740
Gold Coast	10,890	14,000	24,110	38,110	31,000	80,000
Nigeria	100,800	50,400	168,000	218,400	16,800	336,000
Sierra Leone	—	—	—	1,000	—	31,000
Malay States	8,300	21,170	14,100	35,270	8,930	52,500
Trinidad	760	800	380	1,180	50	1,990
Bahamas	—	—	—	430	—	4,400
Jamaica	—	50	1,000	1,050	—	4,200
Cyprus	1,890	630	50	680	1,010	3,580
British Honduras	40	2,400	3,600	6,000	1,960	8,000
British Guiana	900	13,000	64,780	77,780	10,800	89,480
				1,837,160		9,160,220*

* The statements for the following countries give no information under Table I.:—Bermuda, Weihaiwei, Seychelles, Leeward Islands, Windward Islands, Hong Kong.

4. BRIEF NOTES ON THE MOST IMPORTANT TIMBERS AND OTHER FOREST PRODUCTS.

(a) *Timbers.*

The total number of species which are mentioned in the statements as being of economic importance is upwards of 400. There are also many timbers, at present unnamed, which may subsequently be found of commercial value. The summary below is necessarily restricted to a statement of the number of species mentioned (in brackets immediately after the country), and the names of a few of the more important timbers.

The criteria for selecting the more important species are not always given in the statements.

The United Kingdom. (21.) Scots pine (*Pinus sylvestris*), Larch (*Larix europæa*), Spruce (*P. excelsa*) Oak (*Quercus Robur*), Beech (*Fagus sylvatica*), Ash (*Fraxinus excelsior*) and Elm (*Ulmus campestris*).

British India. (Incomplete.) Teak (*Tectona grandis*), Sal (*Shorea robusta*), Deodar (*Cedrus Deodara*), Chil pine (*P. longifolia*).

Canada. (47.) Spruces (*Picea Canadensis*, *P. Sitchensis*, &c.), White pine (*P. Strobus*), Douglas fir (*Pseudotsuga Douglasii*), Hemlock (*Tsuga heterophylla*), Cedar (*Thuja plicata*), Maple (*Acer spp.*).

New Zealand. (9.) Kauri (*Agathis Australis*), Totara (*Podocarpus Totara*), Puriri (*Vitex littoralis*), Beech (*Fagus spp.*).

Australia. (78.) Hoop and Bunya pines (*Araucaria spp.*), Kauri pine (*Agathis Palmerstoni*), Cypress pine (*Callitris spp.*). Numerous eucalypti, e.g., Grey Ironbark (*E. Paniculata*), Spotted gum (*E. maculata*), Ironbark (*E. sideroxylon*), river red gum (*E. rostrata*), blue gum (*E. globulus*), Stringybark (*E. obliqua*), Jarrah (*E. marginata*), Karri (*E. diversicolor*).

South Africa. (10.) Yellow-wood (*Podocarpus spp.*), Stinkwood (*Ocotea bullata*), Cape box (*Buxus Macowanii*).

Newfoundland. (6.) Spruce (*Picea Canadensis*), Balsam (*Abies balsamea*).

Nigeria. (24.) African Mahoganies (*Khaya spp.*, *Entandrophragma spp.*), West African teak (*Chlorophora excelsa*).

Gold Coast. (22.) Similar to Nigeria.

British East Africa. (12.) Cedar (*Juniperus procera*, *Podocarpus spp.*, *Ocotea usambarensis*).

Southern Rhodesia. (20.) *Khaya nyasica*, *Trichelia chirindensis*, *Pygeum Africanum*, *Copaifera mopani*.

- Uganda.** (13.) *Podocarpus gracilior*, *Cynometra Alexandra*,
Entandrophragma spp., *Khaya Anthotheca*, *Chlorophora*
excelsa.
- Nyasaland.** (5.) *Widdringtonia Whytei*, *Khaya senegalensis*,
Adina microcephala, *Piptadema Buchanani*, *Pterocarpus*
angolensis.
- Swaziland.** (21.) *Sidacrylon inerme*, *Curtisia faginea*,
Eugenia Zeyheri.
- Malay Peninsula.** (24.) *Balanocarpus* spp., *Dipterocarpus* spp.,
Shorea spp., *Isoptera Borneensis*, *Calophyllum* spp.
- Cyprus.** (15.) Aleppo pine (*P. halepensis*); *Pinus nigra*,
var Laricio; *Cupressus sempervirens*; *Quercus* spp.
- British Guiana.** (37.) Greenheart (*Nectandra Rodiei*), *Mora*
excelsa, Wallaba (*Eperua* spp.), Crabwood (*Carapa Guianen-*
sis), *Cedrela odorata*.
- Trinidad.** (17.) Cedar (*Cedrela odorata*); *Mora*; *Carapa*.
- British Honduras.** (20.) Mahogany and Cedar.
- Bermuda.** (1.) *Juniperus Bermudiana*.
- Bahamas.** (1.) *Pinus Bahamensis*.
- Windward Islands.** (19.) *Cedrela odorata*; *Nectandra* spp.;
Balata.
- Seychelles.** (7.) *Heritiera Litteralis*; *Calophyllum*.
- Hong Kong.** (1.) *Pinus Massoniana*.
- Jamaica.** No details.

(b) Other Forest Products.

- British India.** Bamboos, grasses (fodder, paper-making), tanning
materials (*Myrabolan*), sandalwood oil (*Santalum album*), Lac
(*Tachardia Lacca*), Rosin and turpentine (*Pinus longifolia*)
and many essential oils, gums, fibres, etc.
- Canada.** Maple Sugar (*Acer saccharum*).
- New Zealand.** Kauri gum.
- Australia.** Eucalyptus oil, tanning material (*Acacia* spp.), sandal-
wood oil (*Santalum cygnorum*).
- South Africa.** Wattle bark (*Acacia decurrens* var. *mollis*), Buchu
(*Barosma* spp.).
- Nigeria and Gold Coast.** Palm oil and kernels (*Elais guineensis*),
"piassava" (*Raphia vinifera*), rubber (*Funtumia elastica*
and *Landolphia* spp.). Gold Coast :—Kola (*Cola acuminata*).
- Nyasaland.** Rubber (*Landolphia* spp.), strophanthus (*Strophan-*
thus spp.), fibres.
- Malay Peninsula.** Canes (*Calamus* spp.), Gutta-percha (*Pala-*
quium oblongifolium), Dammar (*Balanocarpus* spp.).
- British Guiana.** Balata (*Mimusops globosa* and *elata*), gums,
rubber, fruits and oils from numerous species.

5. OWNERSHIP OF FORESTS :—AREA BELONGING TO THE STATE,
AREA UNDER OWNERSHIP OR CONTROL OF OTHER CORPORATE
BODIES, AND AREA PRIVATELY OWNED.

The data from the Statements are summarised in Table II.

TABLE II.
Classification of Forest Area by Ownership.
(Square miles.)

Country.	State.			Corporate Bodies.	Private Individuals.	Total.
	Dedicated to Timber Production.	Other Forest.	Total.			
United Kingdom ...	110	30	140	50	4,990	5,180
British India ...	126,310	125,160	251,470	8,000	77,000 ⁽¹⁾	336,470
Canada (as a whole) ...	234,340	635,580	869,920	62,500		932,420
British Columbia ...	14,700	115,000	129,700	3,900	15,400	149,000
Quebec ...	192,080	312,140	504,220	2,030	9,370	515,620
Australia—						
Queensland ...	6,250	46,880	53,130	9,370 ⁽²⁾		62,500
New South Wales ...	7,880	4,620	12,500	—	4,690	17,190
Victoria ...	6,500	5,500	12,000	190	310	12,500
South Australia ...	250	—	250	—	—	6,000
West Australia ...	10	4,600	4,610	—	310	4,920 ⁽³⁾
Tasmania ...	940	—	940	—	—	17,200
New Zealand ...	—	—	16,370	—	—	16,370
South Africa (Union of)	—	—	880	40	1,440	2,360
Newfoundland ...	—	—	—	—	—	10,000
British East Africa ...	2,200	2,800	5,000	—	100	5,100
Southern Rhodesia ...	—	36,600	36,600	18,300	36,600	91,500
Uganda ...	—	—	1,200	—	—	1,200
Gold Coast ...	—	—	—	38,110	Native Communities	38,110
Nigeria ...	3,140	—	3,140	215,260		218,400
Malay States ...	3,200	28,570	31,770	2,500	1,000	35,270
Trinidad ...	330	830	1,160	—	20	1,180
Bahamas ...	—	—	430	—	—	430
Jamaica ...	—	—	1,050	—	—	1,050
Cyprus ...	630	50	680	—	—	680
British Honduras ...	—	—	6,000	—	—	6,000
British Guiana ...	—	77,780	77,780	—	—	77,780
			1,387,020			1,899,810

Notes.—⁽¹⁾ This area is included in "Other Lands" in Table I.

⁽²⁾ In process of clearing for settlement purposes, which may explain differences for total area of forest in Tables I. and II.

⁽³⁾ Merchantable forest only.

⁽⁴⁾ The statements for the following countries give no information under Table II.—Nyasaland, Swaziland, Bermuda, Weihaiwei, Seychelles, Leeward Islands, Windward Islands, Hong Kong.

The total area of forest accounted for in Table I. is 1,837,160 square miles. The reasons for the difference from the total in Table II. (1,899,810 square miles) are noted at the foot of Table II. Of this total area 1,867,800 square miles are classified according to ownership as follows:—1,387,020 square miles (74 per cent.) belong to the State and 480,780 square miles belong to corporate bodies and private individuals. Of the countries for which this primary classification is made the lowest proportion of State forest is in the United Kingdom (2½ per cent.).

including land acquired but not yet planted. In most parts of the Empire, however, the proportion of State forests is still high (Canada 93 per cent., India 75 per cent., Australia 69 per cent., South Africa 37 per cent., British East Africa 98 per cent., Malay States 90 per cent. and British Guiana 100 per cent.) the chief exception being Nigeria ($1\frac{1}{2}$ per cent.) where the bulk of the forests belong to Native Communities. This is a matter of the utmost importance to the future of forest development since the problems of management are correspondingly simplified. On the other hand, the proportion of State forest which has been "dedicated to timber production"—a figure which indicates in some measure the progress which has been made towards rational forest policy—varies considerably. For British India it is 50 per cent., for Canada 27 per cent. (British Columbia $11\frac{1}{2}$ per cent., Quebec 38 per cent.); for Queensland 12 per cent., New South Wales 63 per cent., Victoria 54 per cent. and Western Australia only $1\frac{1}{5}$ th of 1 per cent.; for Malay States 10 per cent. and British Guiana nil. Out of the 14 countries for which this classification is made 390,900 square miles (29 per cent.) are stated as "dedicated" and 969,000 square miles (71 per cent.) as "other."

6. RELATIONSHIP OF THE STATE TO THE FORESTS.

A. Brief Summary of Existing Legislation.

India:—The earliest forestry legislation of a constructive type is the Indian Forest Act (VII.) of 1878 which, subject to certain amendments and provincial adaptations, is still the basis of Forest policy in British India.

In point of time the rest of the Empire has lagged far behind India, and it is only within the last 15 years or so that Governments have been awakening to the fact that the State is concerned not only with the elementary duties of policing forests with a view to revenue collection and so on, but also with the more complex questions of securing regeneration and sustained productivity on a scale adequate to the needs of the present and succeeding generations. Taken as a whole the Empire is in this respect still in a transition stage, but there is nevertheless a considerable volume of legislation (much of it arising out of the war), and to which only passing reference can be made.

The United Kingdom:—The Forestry Act, 1919, is designed comprehensively to make the country self-subsisting in timber over an emergency period of three years.

Canada:—The Forest Reserves and Parks Act passed in 1906 by the Dominion Parliament and several times amended authorises the setting apart of Forest Reserves and Dominion Parks. As regards the Provinces the British Columbia Forest Act of 1912 and subsequent amendments place the entire charge of the forests under the Forest Branch. In Ontario the Forest Fires Prevention Act, 1917, provides for the appointment of a provincial Forester and for fire protection. The New Brunswick Forest Act of 1918 establishes a Forest Service and makes provision for fire protection. The Nova Scotia Forest Protection Act, 1913, also provides for fire protection. Features of the

Quebec forest legislation are the elaborate fire-protection provisions, prohibition of the export of unmanufactured forest products and the classification of Crown lands into "lands suitable for cultivation" and "lands suitable for forestry." (The former only may be disposed of for colonisation purposes.)

New Zealand :—Section 34 of the War Legislation and Statute Law Amendment Act, 1918 made good the State Forest Act of 1908, which had proved deficient in several respects.

Australia :—The Queensland State Forests and National Parks Act, 1906, provides for the establishment of State Forests and National Parks and the Land Act, 1910, deals further with timber rights and sales. The New South Wales Forestry Act, 1916, consolidated the laws relating to forestry and provides for the dedication, &c. of State Forests and their control under a Commission of three. In Victoria the Forests Act of 1907 consolidated with an amending Act in 1915 forms the principal forest legislation. The Forest Act of 1918 places control in the hands of a Commission of three with wide powers and an appropriation of £40,000 per annum for the development of forestry. In South Australia the Forest Act of 1882 places the control of Forests in the hands of a Commissioner who is stated to have ample powers. The Western Australia Forests Act, 1918, sets up a Forest Department with a conservator in charge, and contains unusual safeguards for the sanctity of State Forest working plans and the staffing of the higher branches of the Service. Three-fifths of the net revenue of the Department are to be used for the development of Forestry.

South Africa :—The Union Forest Act of 1913 and the Amending Act of 1917 provide for the unification of laws formerly in force in the four Provinces of the Union and relate generally to forest tenure, demarcation, regulation and protection.

Nigeria :—The Forest Ordinance, 1916, confers wide powers on the Governor to promote forestry.

Gold Coast :—Ordinance No. 20 of 1907 is stated to require revision.

British East Africa :—Forest Ordinances of 1911, 1915 and 1916 provide wide powers for creating reserves, constituting a forest service, &c.

Uganda :—Legislation is stated to be sufficient for the control of State Forests.

Nyasaland :—Forest Ordinances of 1911 and Crown Lands Ordinance, 1912, prohibit cutting of certain timber. Leases of Government land after 29th November, 1919, provide for the maintenance of a certain percentage of the area as forest.

Southern Rhodesia :—The Forest and Herbage Act of 1859 of Cape Colony and Ordinances of the Rhodesian Legislative Council provide for the protection of the forests.

Malay States :—In the Straits Settlement Ordinance No. XXII. of 1908 follows the Burma Forest Act and India practice generally. As regards the Federated Malay States the existing

legislation of the four States was consolidated in 1914 in a Federal Enactment which was revised in 1918 (Enactment No. 34 of 1918). These also follow the Indian model. There are separate enactments for the Unfederated States.

British Guiana:—The Crown Lands Ordinance, 1913, deals chiefly with the exploitation and protection from trespass of the forests. A Crown Land Regulation of 1919 deals further with the same subjects.

B. Direct Administrative Methods of Forest Development, e.g., Fire Protection, Planting of Waste Areas, Regeneration of Natural Forest.

The methods hitherto put into force in different parts of the Empire vary with the degree to which forest policy has been developed, and the time which has been available for giving effect to policy. British India has consequently made most progress as the following facts illustrate:—Increased efficiency has been secured in fire protection; the area under working plan was 60,700 square miles in 1919 against 2,100 square miles in 1889; the regeneration of natural forests is proceeding and 158,000 acres of plantations have been made.

Fire protection is undoubtedly the question which is receiving the most attention—in Canada in particular where the aeroplane has been brought into use, in Australia and in Africa. It will already have been noted above that a number of the component parts of the Empire have in fact devoted the greater part of the energies of their forestry staffs to this end.

The examination and reservation of the forests is also proceeding steadily, particularly in Australia, but on the evidence of the Statements far too slowly in most parts of the Empire.

With regard to the regeneration of the forests there is evidently a very great deal to be learned. In Australia regeneration appears to be relatively easy with efficient fire protection; for Canada, South Africa and New Zealand the reports are not reassuring. Some of the Statements are silent on this vital point.

More and more plantation work is being done year by year, especially with exotic species. The United Kingdom appears to lead in this respect with a definite programme of planting 150,000 acres in the 10 years 1919-1929.

Plantation work will be the mainstay of forestry in South Africa where, for example, 8,200 acres were planted in 1920 and 9,500 acres are to be planted in 1921. Australia has in view the formation of extensive coniferous plantations, and even Canada has taken preliminary steps for replanting felled areas in the Eastern Provinces and has provided plants for afforestation operations in the Prairie Provinces.

C. Brief Summary of Assistance given to Forestry, e.g., Provision of Nursery Stock, Expert Advice, Grants to Societies, &c., Remission of Taxation.

Provision of Nursery Stock.—In most parts of the Empire the Forestry Departments undertake to supply forest tree plants. In the United Kingdom, with its highly developed nursery trade,

the necessity ~~was not~~ been so great as in newer countries. The scale and the terms on which plants are supplied vary considerably. In South Africa 5,100,000 plants were distributed in 1918-19 "at low prices." In Canada distribution has also been on a large scale, apparently free (*See* p. 230). In South Australia over ten million plants have been distributed during the last 38 years.

In the United Kingdom it is proposed to give grants to the value of £2 per acre for coniferous and £4 per acre for hardwood plantations.

Expert Advice.—It is generally considered that one of the functions of a Forest Department is to advise private individuals with regard to technical forestry problems, and that principle has been followed to a large extent. In addition the Government of India have given considerable help to Indian States and various Governments of the Empire by the loan of the services of technical officers.

Grants to Societies.—The Dominion and most of the Canadian Provinces make an annual grant to the Canadian Forestry Association. The South African Government have made a grant of £1,000 for tree-planting competitions.

Remission of Taxation.—The tendency appears to be to make the taxation on forests as light as possible. The Western Australian Act of 1918 exempts plantations from local rates and taxes.

7. THE FOREST AUTHORITY ("DEPARTMENT" OR "BRANCH") ORGANISATION, POWERS AND DUTIES, INCOME AND EXPENDITURE (SHOWING MAIN BRANCHES ONLY), RECRUITMENT AND TRAINING OF SUPERIOR AND SUBORDINATE STAFFS, PUBLICATIONS AND REPORTS.

The Authority, Organisation, Powers and Duties.—The heterogeneous character of the Forest legislation of the Empire has already been indicated in Section 6A, and it is only to be expected that the different Forest Authorities which take their stand on that legislation should be equally diverse in character. In the following countries the Authority is a Commission (the number of persons constituting the Commission being stated in brackets): The United Kingdom (8, 2 paid 6 unpaid); New South Wales (3); Victoria (3); South Australia (1). The following have authorities in which responsibility focuses in a single person (variously styled Chief Conservator, Conservator, Director, Chief Forester or Forester), who is responsible to a member of the Government of the day or his equivalent in the case of the Crown Colonies:—The Indian Provinces, Canada (both the Dominion and the Provinces), Queensland, New Zealand, South Africa and the Crown Colonies generally. In Western Australia the head of the authority is a Conservator who occupies a position not dissimilar from that of a Commission. The following have merely a rudimentary authority or none at all:—Newfoundland, Tasmania, Nyasaland, Southern Rhodesia, Swaziland, British Guiana, British Honduras, Bermuda, Bahamas, Jamaica, Weihaiwei, the Windward and Leeward Islands.

A further word of explanation is required in the case of British India, where the Inspector-General of Forests is the Chief Adviser of Government and also occupies in respect of most of the provinces a position which may be broadly described as consultative.

Generally speaking, those parts of the Empire which have given serious thought to forestry have been content to place in the hands of a single forest authority all such powers as the State may have taken in respect of constituting forest reserves, the exploitation and protection of State-owned timber, the silvicultural management of the forests, forestry education, research and so on. An important exception is Canada where there are three Branches of the (Dominion) Department of the Interior dealing with Crown lands carrying timber, viz., the Forestry Branch administering the Forest Reserves as regards fire protection, forest surveys, forest products, tree planting, research, etc., the Parks Branch administering the Dominion Parks, and the Timber and Grazing Branch which deals with Timber Berths. These are additional to the Provincial Forest Services, the Commission of Conservation (an advisory body in respect of forestry) and the Board of Railway Commissioners who deal with certain aspects of fire protection.

As regards the general organisation of business, perhaps the simplest is that of New South Wales where, in addition to a secretariat, there are three main branches: "Administration and Finance," "Forest Management" and "Commercial Development" corresponding presumably with the number (3) of Forestry Commissioners. In respect of executive work, some form of territorial organisation is almost essential for the efficient conduct of business in view of the large areas involved. In India the individual forests are aggregated into Circles (in charge of Conservators), while the Circles are sub-divided into Divisions (in charge of members of the Controlling Staff), the Divisions into Ranges (Rangers or junior Provincial officers) and the Ranges into Beats (Forest guards).

With regard to duties it is interesting to note that recent Australian legislation has in certain cases stated quantitatively the area of State forest which is to be constituted within a definite time, while the formulation of working plans has been made a statutory obligation on the Forest Authority.

Income and Expenditure.—Unfortunately the data contained in the Statements are not sufficiently complete to enable a general view of the forest finances of the Empire to be taken. In the United Kingdom the Forestry Commission has had placed at their disposal the sum of £3,500,000 for afforestation purposes during the period 1919-29. In British India the gross revenue has risen from £249,000 on the average of the 5 years 1864-69 to £2,476,000 per annum for 1914-19. The corresponding expenditure figures are £159,000 and £1,408,000. The maximum net revenue was £1,321,000 (1917-18). The graphs supplied with the Statement show that the net revenue has risen progressively with the strength

of the Imperial Service which numbered less than 75 in 1864-69 and about 225 for 1914-19.

As regards Canada the Dominion Forestry Branch expends about \$750,000 per annum and collects about \$84,000; the Timber and Grazing Branch derives \$350,000 from timber and \$145,000 from grazing, &c. The Commission of Conservation's expenditure on forestry is about \$25,000 and there is no revenue. The average annual forest income for British Columbia for the 3 years 1917, '18 and '19 was \$2,728,000 and the corresponding expenditure \$518,000; as nearly as can be ascertained from the Statement the approximate figures for Ontario were receipts \$2,000,000, expenditure \$660,000; Quebec \$1,500,000 and \$100,000; New Brunswick \$685,000 and \$137,000 per annum. Fire protection apparently absorbs more than half the expenditure.

In Australia the Queensland forest revenue for the 15 years 1904-1918 has amounted to £685,500 and the expenditure to £87,600. The corresponding figures for 1918 are £71,500 and £21,900. For New South Wales the average revenue for the 2 years 1917-18 and 1918-19 was £84,300 and the expenditure £99,400; for Victoria (average 5 years 1913-14—1917-18) revenue £60,800, expenditure £63,300. For Western Australia the forest revenue from 1895 to 1919 amounted to £679,600 and the expenditure to £165,300, the figures for 1919 being £42,000 and £10,900 respectively. In South Africa the average revenue for the 3 years 1916-17—1918-19 was £78,600 and the expenditure £167,900.

The New Zealand Government expended £34,800 on nurseries and plantations in 1918/19, but the financial results as a whole are not shown. This remark applies also to Newfoundland.

As regards the rest of the Empire the following average figures also deserve notice: Federated Malay States (5 years 1915/1919), revenue \$942,000, expenditure \$580,000; British East Africa (5 years 1914/15—1918/19), revenue £10,000, expenditure £10,900; Nigeria (1919) revenue £20,800, expenditure £27,400; British Guiana (last 4 years), revenue £14,100, expenditure £2,100.

Recruitment and Training of Superior and Subordinate Staff.—Practically all the organised forestry departments now recruit or will recruit in future their superior staffs from men possessing the degree or diploma of a "recognised School of Forestry." As will be seen subsequently under Section 10, the number of such schools within the Empire is not great. For the United Kingdom, India and the Crown Colonies generally, forest officers have been recruited chiefly from the Universities of Oxford, Cambridge and Edinburgh. The Canadian personnel is recruited from recognised schools in Canada and the United States. Australia, New Zealand and South Africa have gone on the general principle mentioned above without reference to any specified places of training, working on the lines in fact of getting suitable men (British subjects) when and how they could best be obtained.

In practically all cases the subordinate staff are recruited and trained (if at all) locally. Exceptions are the Crown Colonies

where men who have taken courses in the English Woodmen's Schools and at Kew Gardens have been accepted.

Publications and Reports.—Practically all the important services issue annual reports and bulletins, leaflets, etc., on technical subjects. The literature issued by the various forest departments is already a formidable one : India alone accounts for 48 Bulletins, 7 volumes of Forest Records, 11 Memoirs, 8 Forest Manuals, and some 35 leaflets, pamphlets and "other publications."

8. FORESTRY ACTIVITIES OF MUNICIPAL AND CORPORATE BODIES, PRIVATE COMPANIES AND PRIVATE INDIVIDUALS.

The greater part of the forests of the Empire still vest in the State. It is true that considerable areas have been let on lease to companies for exploitation, but even so the usual practice has been to reserve at least the soil, and not as in certain other countries to alienate both timber and soil. Queensland and New Zealand appear to be important exceptions.

In the United Kingdom the bulk of the woodlands are privately owned and the reserve of timber which proved so useful during the war was mainly due to the enterprise of private individuals. In recent years several municipalities have commenced afforesting their water-catchment areas.

In British India many municipalities own forest lands which in most cases are managed in accordance with working plans prepared by forest officers. The forests owned by private companies are badly managed and are deteriorating.

There are fourteen pulp and lumber companies in Eastern Canada which have foresters in their employ, and two of these companies have undertaken re-afforestation programmes on a considerable scale. As yet, however, private enterprise does not constitute a serious factor economically. In British Columbia the Canadian Pacific Railway Company has a Forestry Branch and municipalities and railway companies co-operate in fire protection.

There is no precise information as to the present position of New Zealand, but in 1909 41 per cent. of the total forest area was privately owned.

As regards Australia there appears to be nothing of particular interest to record.

In South Africa many municipalities have initiated afforestation schemes on commercial lines; gold mining companies have established plantations for the production of pit props, and millions of trees are planted annually by private individuals. Private enterprise, however, is confined mainly to the production of mining timber, wattle bark, fencing poles, etc., and it is left to the State to produce timber for general commercial purposes.

In Southern Rhodesia an increasing number of private individuals are establishing forests and two municipalities have embarked on afforestation schemes which are likely to be considerably extended. In the Gold Coast the only private forestry work is that by the Ashanti Goldfields Corporation, who have started a reafforestation scheme on areas denuded of timber for

their mines. In Nyasaland, Eucalyptus and other rapid-growing trees suitable for fuel and poles are extensively planted on private estates.

In the Malay States private forestry is limited to rubber growing.

9. PROFESSIONAL AND OTHER SOCIETIES INTERESTED IN FORESTRY AND THE UTILISATION OF FOREST PRODUCTS.

In the United Kingdom the following societies are engaged exclusively in the promotion of forestry:—The Royal Scottish Arboricultural Society (half-yearly Transactions, edited by Dr. A. W. Borthwick; Secretary, Mr. R. Galloway, S.S.C., 8, Rutland Square, Edinburgh); Royal English Arboricultural Society (publication Quarterly Journal of Forestry, edited by Professor Wm. Somerville; Secretary, Mr. Edward Davidson, Estate Office, Haydon Bridge, Northumberland; Hon. Secretary, Mr. M. C. Duchesne, F.S.I., Farnham Common, Slough, Bucks). Two societies are interested chiefly in the commercial side of forestry, such as encouraging an increased demand for forest products, supply of material, valuation of standing timber, etc.:—English Forestry Association (Hon. Secretary, Mr. M. C. Duchesne, F.S.I., Farnham Common, Slough, Bucks); and the Landowners' Co-operative Forestry Society of Scotland (Manager, Mr. R. B. Fraser, 34, Queen Street, Edinburgh). The Surveyors' Institution, the Land Agents' Society and a number of other societies also include Forestry as one of the branches of their activities.

As regards utilisation of forest produce the chief is the Timber Trade Federation (General Secretary, Mr. C. E. Musgrave, F.C.I.S., Oxford Court, London), which is a central organisation for promoting the common interests of the timber industry of the United Kingdom.

In India the Indian Forest Service produces departmentally the *Indian Forester*.

The Canadian Forestry Association (Secretary, Mr. Robson Black, 206, Booth Buildings, Ottawa) has for its aims the promotion of Forestry in Canada, and publishes monthly the *Canadian Forestry Journal*. There is also a society of professional foresters namely, the Canadian Society of Forest Engineers, whose official organ is the *Journal of Forestry*, published in U.S.A.

The Australian Forestry League, whose headquarters are in Melbourne, publishes a quarterly journal called the *Gum Tree*. There is a branch of the League in Western Australia whose quarterly journal is called *Jarrah*.

There is no society interested exclusively in Forestry in South Africa, although a number of societies are interested in the question of timber supply.

10. EDUCATION, RESEARCH AND EXPERIMENTAL WORK.

A. *Education*.—The first school in the United Kingdom for training Forestry officers was set up at Cooper's Hill, in connection with the Royal Engineering College, in 1885 by the India Office. This was followed by lectureships in Forestry at Edinburgh University in 1891 and in the University of Wales (Bangor) in

1904. In 1905 the Forestry School at Cooper's Hill was removed to Oxford University, and two years later Forestry instruction was begun at Cambridge University. At the present time forest officers for the Home and Indian services are recruited almost exclusively from Oxford, Cambridge and Edinburgh. The courses with subsidiary subjects occupy a minimum of three years and include practical instruction in the forest. Instruction in Forestry is also given at the following institutions: the Armstrong College (University of Durham, Newcastle-on-Tyne); Aberdeen University; Edinburgh and East of Scotland College of Agriculture; Royal College of Science, Dublin.

As regards the training of "woodmen" or "foresters," schools for forest apprentices exist in the Forest of Dean (since 1904); at Chopwell Woods (near Newcastle-on-Tyne); Burley (New Forest); Beaufort, Beaulieu, Inverness-shire; and at Avondale in Ireland. These schools provide a two-year course and are intended to train men for private estates and for the subordinate supervisory work of the Forestry Commission. A certain number of Forest of Dean men have also been taken into the African Crown Colony services.

The principal education centre in India is at Dehra Dun, in the United Provinces, where two-year courses are provided for the provincial services and for Rangers. Ranger training is now in process of decentralisation; well-appointed schools already exist at Coimbatore (Madras) and Pyinmana (Burma) while a school is being started at Dharwar (Bombay). There are also elementary forest schools for foresters and guards in nearly every province.

In Canada the Universities of Toronto and New Brunswick provide regular four-year courses leading to the degree of B.Sc. in Forestry and also more elaborate six and five year courses. The Quebec Provincial Government in 1910 founded a school, which is affiliated with Laval University, for training men for its own service. There is also an elementary course at Macdonald College, the Agricultural College of McGill University, and the Ontario Agricultural College, Guelph, provides instruction in farm Forestry. There is as yet no regular school of Forestry in British Columbia, but one is to be established in the near future in the University of British Columbia, where elementary courses have recently been given to returned soldiers.

The establishment of a school for Forest Officers is now under consideration in Australia. A Forestry course has been in existence at Adelaide University for some years. A school for Forest apprentices was established at Creswick (Victoria) in 1910 and provides a practical course. A Forest school is also projected at Imbil (Queensland).

There is a school for training the subordinate staff in South Africa at Tokai, where a course lasting a year and nine months is provided.

B. Research and Experimental Work.—The only section of the Empire which has organised its research and experimental work on systematic lines is British India, which set up a Forest Research Institute at Dehra Dun in 1906. The well-organised museums, offices, laboratories and workshops were not completed

until 1914, and enlargements, which are estimated to cost £500,000, are already in progress. Research at Dehra Dun is divided into five main branches (Silviculture, Forest Botany, Economic Products, Zoology and Chemistry), each in charge of research officers with experts for special subjects such as cellulose. The output from the institute is already large. In addition to the central research work at Dehra Dun, research is projected on a large scale in the Provinces.

A considerable amount of research and experimental work has been carried on in the United Kingdom in a somewhat disjointed way at various times by private individuals, institutions and Government Departments. The work has not yet, however, been co-ordinated with the actual forestry requirements of the country. The Forestry Commission have carried out surveys of the rate of growth of conifers in the United Kingdom and of insect conditions following on the heavy war fellings, and are engaged on problems connected with afforestation work generally. Certain work has also been carried out on the mechanical properties of home-grown and colonial timbers and on fungus pests (*e.g.*, of larch).

The Canadian statement is silent on the subject of research and experiment, although references to the work done on forest products at McGill and to other questions will be found in the proceedings of the Conference.

In Australia systematic work has now been begun on the rate of growth of native trees and on their commercial possibilities. It is intended to set up a Forests Products Laboratory for the whole Commonwealth in Western Australia.

A great deal of valuable experimental work has been done in South Africa with reference to afforestation work. Investigations into the seasoning of indigenous timbers is now proceeding. In the past mycological and similar work has been done by officers of the Department of Agriculture.

In the Malay States continuous work has been in progress on the flora of the Peninsula, a few experimental plots have been established and a careful study of the indigenous timbers is now proceeding.

Reference has not been made above to the trial of exotic species to which most forest departments have turned attention. Much valuable work has been done, and the United Kingdom, Australia, New Zealand and South Africa, among other parts of the Empire, are already reaping the benefits of this unobtrusive work.

11. ANNUAL INCREMENT AND UTILISATION OF HOME-GROWN TIMBER.

(For definition of terms used below see para. 11, p. 266.)

Sections 11, 13 and 14 (Tables III., IV., VI. and VII.) would show definitely (if full statistical information were available as to increment, timber losses, utilisation, home consumption, imports and exports of timber) whether the Forestry position of the individual parts of the Empire were satisfactory or the reverse. Comparatively few Forestry departments, however, have felt themselves sufficiently armed with data to attempt to state the position with precision.

TABLE III.
Annual Increment.

(All quantities are in thousands.)

Country. (1)	Area. (2)	Estimated Increment per Sq. mile. (3)	Total Gross Increment. (4)	Losses. (5)		Total. (7)	Net Increment (Col. 4, less Col. 7). (8)
				Fire.	Waste, etc.		
United Kingdom (1920) ...	Sq. miles. 5·180	Cubic feet. 8·0	Cubic feet. 41,640	Cubic feet. 10% gross increment.	Cubic feet. 10% gross increment.	Cubic feet. 4,164	Cubic feet. 37,476
British India (under State control)	126·310	9·6	1,212,500	14,000	21,500	35,500	1,177,000
British Columbia ...	149·340	5·3	796,500	25,000	277,333	302,333	494,167
Quebec ...	203·490	3·2	658,469	17,440	243,750	261,190	397,279
Australia :—							
Queensland ...	11·000	2·7	29,333	7,333	14,667	22,000	7,333
Victoria ...	9·380	19·2	180,000	3,600	27,000	30,600	149,400
West Australia (under State control).	4·610	—	Not available.	—	—	—	Loads. 266
South Africa (Union of) ...	2·360	—	105,321	Not available.	Not available.	—	Cubic feet. —
British East Africa ...	2·300	12·8	28,160	1% of gross increment.	—	282	27,878
Southern Rhodesia ...	18·300	—	Not available.	—	—	—	42,681
Gold Coast ...	14·000	32·0	448,000	Nil.	5% of gross increment.	22,400	425,600
Malay States ...	24·170	—	Tons. 7,877	—	Tons. 4,112	Tons. 4,112	Tons. 3,765
Trinidad (under State control) ...	1·130	19·2	Cubic feet. 21,734	15	Cubic feet. 1,719	Cubic feet. 1,734	Cubic feet. 20,000

Notes.—(1) The Statements for the following countries give little or no information : Canada (as a whole), New South Wales, South Australia, New Zealand, Newfoundland, Uganda, Nyasaland, Swaziland, Nigeria, Bermuda, Bahamas, Jamaica, Cyprus, British Honduras, British Guiana, Wei-hai-wei, Seychelles, Windward Islands, Leeward Islands and Hong Kong.

(2) The above quantities are those given in the respective statements. For rough comparative purposes the following figures may be used : 1 load = 50 cb. ft.; 1 ton = 30 to 50 cb. ft. according to species and degree of dryness ; 1 board foot = $\frac{1}{12}$ cubic foot ; 1 cord = 128 cb. ft. of piled wood and contains approximately 90 cb. ft. of solid wood.

A. Increment.—Thirteen Statements (covering a forest area of 571,570 square miles) furnished a return in the form of Table III. The net increment for 569,210 square miles was approximately 2,980 million cubic feet, or 5,235 cubic feet per square mile. For 546,300 square miles both the gross and the net increment are given, the difference on the totals of the two being 23 per cent. of the gross increment. Unfortunately increment figures for Canada as a whole are not available. It is stated, however, that the fire losses of merchantable saw timber in British Columbia, the Prairie Provinces, Ontario, part only of Quebec and New Brunswick average about 40 million cubic feet per annum. It is also surmised that the total losses from fire, decay, insect and fungus damage, etc. may amount to as much as 2,500 million cubic feet per annum.

Table III. does not differentiate between commercial and non-commercial timbers. This has to be borne in mind in reading, for example, the figures for the Gold Coast which comes third on the list as regards mere volume.

B. Utilisation.—Annual utilisation for home consumption or export showing proportion from forests under State control.

Seventeen Statements furnished a return in the form of Table IV. The countries are the same as for Table III. with the addition of Canada (as a whole), New South Wales, Cyprus and British Guiana.

While the figures are some pre-war and some post-war, and consequently are not adaptable for summarising, those for the individual countries are interesting. The utilisation for the United Kingdom is placed at a very high figure (80 million cubic feet) and is an aftermath of the War. The figures for India exclude consumption by right holders and free grantees. If these are included, the total utilisation becomes 347 million cubic feet. The Canadian estimate is for the total volume of the trees which were cut (1910/14) in order to produce the lumber sawn in Canadian saw-mills for home consumption and export, and for the pulpwood consumed in Canadian pulp mills and the pulpwood exported unmanufactured. This quantity is consequently short of the total utilisation, which has been estimated as high as 2,500 million cubic feet for all classes of forest products.

The Queensland figures are made up of 18,700,000 cubic feet timber, etc., and 245,000 tons of fuelwood. The Western Australian square or hewn timber (268,827 loads) is estimated as the equivalent of 806,500 loads of standing timber, since the saw-mills recover only $33\frac{1}{3}$ per cent. of the timber fed into them.

12. FOREST INDUSTRIES.

The chief information supplied in the Statements is summarised in Table V. The term "forest industries" is a wide one and has evidently received different interpretations. After the initial stages of manufacture forest products are so widely distributed through industrial processes that it is almost impossible to estimate the employment which they furnish or to draw a satisfactory line of demarcation between "forest industries" and industries generally.

TABLE IV.
Utilisation.

Country. (1)	Type of Product. (2)	Quantity (thousands). (3)	Value at place of preparation (thousands). (4)
United Kingdom (1920)	Timber, pitwood, etc.	80,000·0 cu. ft.	£5,000·0 to £6,000·0
British India (under State Control)	Sleepers and timber	87,000·0 "	£3,000·0
	Firewood	173,000·0 "	£350·0
	Other products	—	£1,535·4
Canada (as a whole) (1910-14)	Saw-timber and pulpwood	1,106,888·0 "	Not available
British Columbia (1919)	Logs, poles, fuel, etc.	149,515·7 "	Not available
Quebec	Timber and pulpwood, etc.	240,349·7 "	Not available
Australia :—			
Queensland	Timber, poles, etc.	18,700·0 "	£312·5
	Fuel	245·0 tons	£15·8
New South Wales	Raw timber	24,268·7 cu. ft.	£2,400·0
Victoria	Timber	8,333·3 "	£750·0
	Fuel	40,140·0 "	£300·7
	Other products	5·1 tons	£92·9
West Australia	Timber	268·8 loads	£930·9
	Fuel	783·0 tons	£548·1
	Sandalwood and mallet	11·0 "	£102·6
South Africa	Timber, mine props and firewood	65,941·9 cu. ft.	£552·7
British East Africa	Timber and fuel	3,388·1 "	£10·0
Southern Rhodesia	Timber, mine props and firewood	61,458·3 "	£164·1
Gold Coast	Timber and fuel	10,899·0 "	£492·7
Malay States	Timber and fuel	5,250·0 tons	£35,550·0
Trinidad (under State control)	Timber and firewood	2,440·0 cu. ft.	£73·0
Cyprus	Timber and fuel	2,084·0 "	£30·7
British Guiana (1915-19) (under State control)	Timber	776·2 "	£65·2
	Fuel	78·6 "	£48·4
	Other products	—	£132·0

Notes.—(1) The Statements for the following countries give little or no information : New Zealand, Newfoundland, Uganda, Nyasaland, Swaziland, Nigeria, Bermuda, Bahamas, Jamaica, British Honduras, Wei-hai-wei, Seychelles, Leeward Islands, Windward Islands, Hong Kong.

(2) See note 2, Table III.

TABLE V.
Forest Industries.

Country.	Industry.	Estimated Volume of timber consumed (thousands).	Estimated Value of product at place of preparation (thousands).	No. of persons employed (thousands).
United Kingdom (1909-13) ..	Silviculture Preparation of home-grown timber	125.0 to 175.0 loads	£200.0 to £300.0	16.2
British India	Timber Trades, etc. Silviculture, etc. Lumbering and woodworking industries Firewood, charcoal, etc. Lumbering Pulp manufacture Lumbering, pulp manufacture, etc.	Cannot be estimated. — 107,540.0 cu. ft. 173,000.0 " 898,769.5 " 100,580.2 " 149,515.7 "	£26,000.0 — £4,762.0 £350.0 \$69,793.9 \$13,145.6 Not available	132.0 175.0 approx. 765.5 150.0 34.8 15.3 28.0
Canada (1910-14) (as a whole)				
British Columbia (1919) ..				
Australia :—				
Queensland	Sawmilling Lumbering	15,000.0 " ?	£1,340.0 —	3.5 1.5 to 2.0
New South Wales	Lumbering Sawmilling output	24,268.7 " 10,562.0 "	£2,400.0 £1,072.9	7.1 4.3
Victoria	Lumbering, sawmilling, etc.	51,950.0 "	£1,869.5	5.1
West Australia	Lumbering, sawmilling and allied industries Firewood, etc.	290.7 loads 783.0 tons	£1,388.3 £548.1	6.6 1.5
South Africa (Union of) ...	Timber Trades, etc.	Cannot be estimated	£1,091.9	6.6
British East Africa	Timber Fuel-wood Timber	456.1 cu. ft. 2,932.0 " 1,383.5 "	£6.1 £3.9 £207.5	0.1 Europeans. Not known.
Gold Coast	Lumbering	Cannot be estimated.	—	30.0
Malay States	Lumbering	2,198.0 cu. ft.	£16.2	0.2 to 0.3
Bahamas	Lumbering and firewood	?	?	0.7 approx.
Cyprus	Timber	483.5 "	\$241.2	3.0
British Guiana (1915-19) ..	Fuel, etc. Balata	72.6 tons Nil : all exported.	\$252.0 —	3.6

Notes.—(1) The Statements for the following countries give little or no information : Quebec, South Australia, New Zealand, Newfoundland, Southern Rhodesia, Uganda, Swaziland, Nigeria, Bermuda, Bahamas, Jamaica, Trinidad, British Honduras, Wei-hai-wei, Seychelles, Leeward Islands, Windward Islands and Hong Kong.

(2) See note (2), Table III.

Only two countries (the United Kingdom and British India) enter timber growing as a forest industry. The number of persons employed in the United Kingdom was estimated at 16,200 (3 per sq. mile of forest) and in India at 175,000 (approximately 0.7 per sq. mile). The timber trades (including the furniture, etc., trade) of the United Kingdom employed 239,200 persons, and the selling value of goods less materials used was £21,442,000 for 1907. The figures in Table V. are for the sawmilling, crate, carriage and coopering trades. The census of 1911 showed that 735,000 persons in all were to a greater or less extent working on wood and timber. The Indian census of 1913 showed that $2\frac{1}{2}$ million people were dependent on wood cutting and wood working. The total number employed in the forest and on forest products is estimated at $4\frac{2}{3}$ millions; "between $4\frac{1}{2}$ and $5\frac{1}{2}$ million people in British India are dependent on forestry and allied industries for their livelihood for the greater part of the year."

The Canadian figures relate to the lumbering and pulp and paper industries only and do not by any means represent the total employment provided by the forests. For British Columbia the value of production (1919) was \$70,285,100, including lumber \$31,000,000, pulp and paper \$12,554,300 and shingles \$12,801,600. The pulp and paper industry produced 46,900 tons of pulp and 130,800 tons of paper and gave employment to some 3,000 persons. The Quebec statement gives the following information: (a) Saw-logs, 789,800,000 board feet, valued at \$19,686,000, (b) "Other forest products" \$21,076,000, including 1,599,000 cords of pulp wood (\$15,193,000), 5,041,500 railway ties (\$2,793,000) and 324,329,500 shingles (\$1,050,800). Saw mills number 2,200 and pulp and paper mills 33, the latter producing 784,250 tons of pulp from 1,109,900 cords of wood in 1917.

The Australian figures relate chiefly to the lumbering and saw-mill trades and fuel getting. The Victorian Statement includes cabinet-making, which employs 1,840 persons with a productive value of £524,600, and the Western Australian "Furniture," valued at £112,100.

The total number of persons employed in the wood-working industries in South Africa (1916-17) was 9,654, using materials valued at £1,516,600, and having an output of approximately £2,793,000. Saw-mills employed 2,300, coach and wagon building 2,970 and furniture making 2,235 persons. The brush-making trade, ship and boat building and the furniture and allied trades, which employed between them 3,068 persons, are omitted from the figures in Table V.

13. EXPORTS AND IMPORTS OF TIMBER.

Table VI. shows the quantities and values of exports and imports and the balance + or - according as exports are greater or less than imports. The figures are partly war and partly pre-war, and therefore cannot be fairly summarised. The different countries may be classified into two categories: those importing more than they export and those exporting more than they import. To the former category belong the United Kingdom, British India,

TABLE VI.
Average Annual Exports and Imports.
(Quantities and Values in thousands.)

Country.	Exports.		Imports.		Balance plus or minus.	
(1)	Quantity. (2)	Value. f.o.b. (3)	Quantity. (4)	Value. c.i.f. (5)	Quantity. Col. 2-Col. 4.	Value. Col. 3 Col. 5.
United Kingdom (1909-13)—						
Wood and timber ...	120·8 loads	£1,015·5	10,204·3 loads	£27,561·4	—10,083·5 loads	—£26,545·9
Wood manufactures ...	—	£2,211·9	—	£2,695·2	—	—£483·3
Pulp of wood ...	15·3 tons	£122·8	859·5 tons	£4,058·5	—844·2 tons	—£3,935·7
British India (1914-18)—Timber	1,647·9 cu. ft.	£395·9	4,373·2 cu. ft.	£531·9	—2,725·3 cu. ft.	—£136·0
Canada (1914-18) (as a whole)—						
Sawn lumber ...	356,689·4 cu. ft.	\$30,765·5	99,070·9 "	\$10,603·6	+257,618·5 "	+£20,161·9
Pulp wood ...	102,933·3 "	\$6,412·5	Nil	—	+102,933·3 "	+£8,412·5
British Columbia (1919)—Overseas	9,072·7 "	Not available	Negligible	Negligible	+9,072·7 "	Not available
Quebec (1918) ...	132,192·3 "	\$14,877·4	—	\$746·5	+132,192·3 "	+£14,130·9
Australia—						
Queensland—Timber	2,000·0 "	£500·0	6·0 cu. ft.	£1·5	+1,994·0 "	+£498·5
New South Wales (1910-18)—						
Timber ...	1,633·7 "	£201·1	12,241·5 "	£1,046·4	—10,607·8 "	—£845·3
Victoria (1913-17)—Timber	74·9 "	—	10,365·5 "	—	—10,290·6 "	—
West Australia (1909-19)—Timber	181·3 loads	£689·1	18·2 loads	£97·8	+163·1 loads	+£591·3
South Africa (Union of) (1913)—						
Unmanufactured ...	—	£3·3	15,618·0 cu. ft.	£980·8	—	—£997·5
Manufactured ...	—	£5·7	3,882·0 "	£577·7	—	—£572·0
Newfoundland (1909-12)—Timber ...	3,677·3 bd. ft.	\$71·1	1,632·4 bd. ft.	\$53·9	+2,044·9 bd. ft.	+£17·2

British East Africa (1913-18) ...	327.4 cu. ft.	£11.9	159.6 cu. ft.	£16.7	+ 167.8 cu. ft.	—£4.8
Southern Rhodesia (1913-19)—Timber	34.1 "	£10.5	258.1 "	£42.5	—224.0 "	—£32.0
Nyasaland (1917-19) ...	Nil	—	—	£0.8	—	—£0.8
Uganda (1913) ...	—	—	—	£3.2	—	—£3.2
Gold Coast (1903-18)—Timber ...	1,383.5 cu. ft.	£159.7	346.2 cu. ft.	£45.0	+ 1,037.3 cu. ft.	+£114.7
Nigeria (1912-13)—Timber ...	1,388.7 "	£92.3	522.8 "	£64.2	+ 865.9 "	+£28.1
Malay States (1913-18)—						
Firewood ...	—	£1.7	—	£590.5	—	—£588.8
Planks... ..	—	£1,531.3	—	£383.2	—	+£1,148.1
Timber ...	—	£164.0	—	£1,183.6	—	—£1,019.6
Trinidad (1906-18)—Timber...	152.0 cu. ft.	£17.8	889.5 cu. ft.	£65.3	—737.5 cu. ft.	—£47.5
Bahamas (1907-13)—Lumber	293.8 "	£11.2	71.4 "	£5.2	+ 222.4 "	+£6.0
Bermuda (1919)—						
Lumber ...	—	—	46.4 "	£5.5	—46.4 "	—£5.5
Manufactured wood ...	—	—	—	£18.8	—	—£18.8
Jamaica (1914-18)—Lumber...	—	—	8,905.9 bd. ft.	£50.5	—8,905.9 bd. ft.	—£50.5
British Honduras (1914-19)—Timber	8,305.9 bd. ft.	£739.0	1,447.9 "	£41.6	+ 6,858.0 cu. ft.	+£697.4
British Guiana (1915-19)—Timber ...	122.7 cu. ft.	£15.0	337.7 "	£41.9	—215.0 "	—£26.9
Cyprus (1910 14)—Timber ...	—	—	—	£21.7	—	—£21.7

Notes.—(1) The United Kingdom exports include 87,500 loads, which are re-exports valued at £795,200.

(2) The Statements for the following countries give little or no information : South Australia, New Zealand, Swaziland, Wei-hai-wei, Seychelles, Leeward Islands, Windward Islands and Hong Kong.

(3) See Note (2) Table III.

Australia (as a whole, but excluding Tasmania), South Africa, British East Africa (as regards values), Southern Rhodesia, Malay States, British Guiana and various small countries; and to the latter, Canada, Newfoundland, British East Africa (as regards volume), Gold Coast, Nigeria and British Honduras.

On the subject of source of imports and distribution of exports the Statements are not very explicit. The two most important countries in the Empire from this point of view are the United Kingdom (the chief importer) and Canada (the chief exporter). The United Kingdom drew (1909-13) 88 per cent. by volume and 83 per cent. by value of her imports from without the Empire. Three main regions of supply may be differentiated, viz., Northern Europe (Russia and Scandinavia) furnishing 65 per cent. by volume of the total imports, South-west Europe 48 per cent. of the pitwood imports and North America 18½ per cent. by volume of the total imports. The imports not accounted for above came from a large number of countries and consisted chiefly of special woods, *e.g.*, teak from India, Eucalyptus (Jarrah, etc.) from Australia and African mahogany from the Gold Coast and Nigeria.

The imports from Canada into the United Kingdom amounted to 1,058,000 loads valued at £3,525,000. On the other hand the destination of Canadian exports is not stated. The whole of the pulp-wood (approximately 103 million cu. ft.) goes to the United States, and presumably the bulk of the sawn timber not taken by the United Kingdom. The British Columbia export of 9,073,000 cu. ft. (1919) included approximately 5½ million cu. ft. to the United Kingdom and the Continent and 1,432,000 cu. ft. to China. It will be observed that while Canada is the chief timber exporter of the Empire, she is also the second importer. Rough lumber, oak, cherry, hickory, etc., and pitch pine are the chief imports.

The Indian imports consist chiefly of railway sleepers and Jarrah timber (from Australia) and deal and pine timber. Teak represents about 85 per cent. of the exports.

As regards Australia the Queensland exports are to other States of the Commonwealth, while the imports are overseas. The New South Wales exports are principally to New Zealand, the Pacific Islands and the East. The Victorian imports were chiefly soft-woods from Scandinavia, the United States, Canada and New Zealand. Rather more than one-third of the Western Australian exports go to the Eastern States: India, the United Kingdom, New Zealand and South Africa in that order being the next best customers. The United States supplied approximately one-half of the imports and Scandinavia rather more than one-sixth.

As regards the South African imports of unmanufactured timber, Scandinavia supplied 10,452,000 cubic feet, the United States 2,632,200 cubic feet, Australia 440,500 cubic feet, and India (teak) 92,900 cubic feet. The imports of manufactured timber, £103,592, came chiefly from Scandinavia.

14. SUMMARY AND OUTLOOK.

A. *The total home consumption of home-grown and imported timber compared with the total increment.*

The data from the Statements are summarised in Table VII, which is built up from Tables III (Increment), IV (Utilisation) and VI (Imports and Exports). Table VII is therefore correspondingly incomplete. Most countries are both importers and exporters of timber, while exports may consist partly of home-grown and partly of imported timber (as in the case of the United Kingdom).

The following equation expresses the relationship between the terms used in these tables:

$$\text{Consumption} = \text{utilisation} + \text{imports} - \text{exports.}$$

A comparison of utilisation with increment indicates whether the forests are being overcut or the reverse. A comparison of utilisation with consumption indicates whether a country is pulling its weight for the time being as regards the volume of timber put on the market (which is not the same thing as being self-supporting).

The various parts of the Empire may be classified as follows:—

Utilisation exceeds increment in the United Kingdom (1920), Southern Rhodesia, the Malay States, Queensland and Western Australia. The position is not clear in Canada as a whole (where the increment is unknown), Newfoundland, Australia as a whole, South Africa and British Guiana.

Increment exceeds utilisation in India, British Columbia, Quebec, Victoria, East Africa, the Gold Coast and Trinidad.

Consumption exceeds utilisation in the United Kingdom, India, South Africa, Southern Rhodesia, Malay States and British Guiana. For the United Kingdom the excess (in 1909-13) was about 10 million loads (500 million cubic feet), for India about 5½ million cubic feet and for South Africa nearly 20 million cubic feet.

Utilisation exceeds consumption in Canada as a whole, British East Africa and the Gold Coast. The excess in Canada amounted (1910-14) to 460½ million cubic feet.

The unenviable position of the United Kingdom and the Malay States in which the consumption exceeds the utilisation and the utilisation the increment will be noted.

When consumption is compared with increment (which is in a sense the simplest gauge of the present forestry situation) British India, British Columbia, Quebec, Victoria, East Africa, the Gold Coast and Trinidad are on the safe side. The United Kingdom, Queensland, Western Australia, Southern Rhodesia and the Malay States are on the wrong side.

As regards consumption and utilisation *per head of population* the figures are naturally highest in those countries where timber is most plentiful. In British Columbia, for example, utilisation is placed at 340 cubic feet and consumption at 44 cubic feet. India appears to be able to subsist on less than 1½ cubic feet. The consumption for the Australian States runs from 17½ to 48 cubic feet, for South Africa 12¼ cubic feet, and for the United Kingdom

TABLE VII.
Quantities in thousands.

Country.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
United Kingdom (1909-1913)—								
Wood and timber ...		800·0 loads.		766·7 loads.	9,863·8 loads.	} 10,883·5 loads. 844·2 tons. 352,450·0 cu. ft.	1,185·0 loads.	— 9,698·5 loads.
Furniture wood ...		—	—	—	253·0 "		—	— 844·2 tons.
Pulp of wood ...		347,000·0 cu. ft.	3,296·0 cu. ft.	343,704·0 cu. ft.	8,746·0 cu. ft.		1,177,000·0 cu. ft.	+ 824,550·0 cu. ft.
British India ...								
Canada (1910-14) (as a whole)—								
Saw-timber ...		898,769·5 "	356,689·4 "	542,080·1 "	99,070·9 "	641,151·0 "	Not available.	Not available.
Pulpwood ...		208,118·5 "	102,933·3 "	105,185·2 "	—	105,185·2 "	"	"
Total ...		1,106,888·0 "	459,622·7 "	647,265·3 "	99,070·9 "	746,336·2 "	"	"
British Columbia—								
Timber and pulp- wood.		149,515·7 cu. ft.	130,015·7 cu. ft.	19,500·0 cu. ft.	Negligible.	19,500·0 cu. ft.	494,167·0 cu. ft.	+ 474,667·0 cu. ft.
Quebec—								
Timber and pulp- wood.		240,349·7 "	132,192·3 "	108,157·4 "	"	108,157·4 "	397,279·4 "	+ 289,122·0 "

Australia—	19,600-0 "	2,000-0 "	17,600-0 "	6-0 "	17,606-0 "	7,333-0 "	— 10,273-0 "
Queensland (all classes).							
New South Wales—							
Timber (all) ...	24,268-7 "	1,633-7 "	22,635-0 "	12,241-5 "	34,876-5 "	—	—
Victoria—							
Timber and fuel	48,473-3 "	74-9 "	48,398-4 "	10,365-5 "	58,763-9 "	149,400-0 "	+ 90,636-1 "
Western Australia—							
Timber ...	806-5 loads.	544-0 loads.	262-5 loads.	54-6 loads.	317-1 loads.	266-3 loads.	— 50-8 loads.
South Africa—							
Timber ...	65,941-9 cu. ft.	43-0 cu. ft.	65,898-9 cu. ft.	19,500-0 cu. ft.	85,398-9 cu. ft.	—	—
British East Africa—							
Timber ...	3,388-1 "	327-4 "	3,060-7 "	159-6 "	3,220-3 "	27,878-4 cu. ft.	+ 24,658-1 cu. ft.
Southern Rhodesia—							
All classes ...	61,458-4 "	34-1 "	61,424-3 "	258-1 "	61,682-4 "	42,681-5 "	— 19,000-9 "
Gold Coast—							
Timber and fuel ..	10,899-0 "	1,384-0 "	9,515-0 "	346-0 "	9,861-0 "	425,600-0 "	+ 415,739-0 "
Malay States—							
Timber and fuel ...	5,250-0 tons.	—	5,250-0 tons.	250-0 tons.	5,500-0 tons.	3,765-1 tons.	— 1,734-9 tons.
Trinidad—							
Timber and fuel ...	2,440-0 cu. ft.	152-0 "	2,288-0 cu. ft.	889-5 cu. ft.	3,177-5 cu. ft.	20,000-0 cu. ft.	+ 16,822-5 cu. ft.
British Guiana (1915-19)—							
Timber ...	726-2 "	122-7 "	603-5 "	337-7 "	941-2 "	Unknown.	Unknown.

Notes.—(1) Re-exports of timber from the United Kingdom 87,500 loads, of pulp of wood 15,300 tons are omitted from col. (5).

(2) All the figures for British India and Western Australia are for timber in the round, the factors for comparison with sawn timber being 2 and 3 respectively (*cf.* Table VI).

(3) The Statements for the following countries give little or no information : South Australia, New Zealand, Newfoundland, Nyasaland, Swaziland, Uganda, Nigeria, Bermuda, Bahamas, Jamaica, Cyprus, British Honduras, Wei-hai-wei, Seychelles, Leeward Islands, Windward Islands, and Hong Kong.

(4) *See* note (2), Table III.

13-14 cubic feet. The above figures require explanations which cannot be entered into here, but it is safe to say that if they included all forms of wood and timber and were expressed wholly in terms of standing timber they would need to be increased materially.

B. Probable duration of supplies at the normal rate of cutting and growth.

It is pointed out in several of the Statements that a direct answer to this question is very difficult to furnish and might easily be misleading. In certain cases which are noted below it is possible to state how long it will take to work out certain classes of timber if the present rate of cutting is maintained. It has already been shown, however, in Table III, that there exist in the Empire very large areas of forest which are at present classed as "inaccessible or unmerchantable." No doubt there is much good timber in them which it would pay to work if prices rose in consequence of the exhaustion of the more accessible forests.

In the United Kingdom (1920) the utilisation was estimated at double the increment. It is anticipated, however, that with the gradual resumption of trade relations the drain on the forests will soon diminish. The outlook is admittedly obscure.

In British India, provided that the present forest policy is maintained, "progress in forest production will have no difficulty in keeping pace with the industrial development of the country."

The utilisation of timber for lumber in Canada has decreased since 1912, and is still decreasing, while the utilisation of pulpwood is increasing rapidly as supplies are exhausted in the United States. The outlook appears to be assured in British Columbia and Quebec with a reasonable system of fire protection. It is preferred to give no estimate of the duration of supplies for Canada as a whole. New Brunswick intends to limit the utilisation to the amount of the increment so soon as the latter can be determined.

As regards Australia, the Queensland forests are apparently being overcut to the extent of more than double the increment. The Hoop-pine resources of New South Wales will be exhausted in 12 years, the Cypress pine forests can apparently maintain approximately the present supply, while the hardwood forests (under management) could maintain their present out-turn indefinitely. Victoria has still 2,000,000 acres of hardwood forests untouched and a large balance of increment over utilisation. It is safe to say for South Australia that the consumption far exceeds the increment, but it is anticipated that with the coniferous plantations already formed or about to be formed, the State will ultimately meet its own requirements in softwoods. The Western Australian Statement makes the following comment "*Western Australia is going to leeward at the rate of 500,000 loads a year*

over the rate of growth of her Forests." It is estimated that 15 years will see the shutting down of the large Jarrah mills.

No information is given in the respective Statements as regards the position in New Zealand and Newfoundland.

The accessible indigenous forests of South Africa will probably be more or less worked out in the next 10-15 years, after which the supply of virgin timber will be reduced by 50 per cent. unless forests at present inaccessible are opened up. In the meantime the plantations of exotic species will be developing and can be relied on to give a steadily increasing output.

The Gold Coast and Nigeria with ordinary care should maintain their out-turn of African mahogany. In British East Africa the accessible forests are being overcut and satisfactory regeneration is not being secured. The increment as a whole, however, exceeds utilisation, and it should be possible to keep the position right. Southern Rhodesia is drawing on its forest capital to the extent of 19 million cubic feet per annum, and in view of possible developments, the position is considered serious.

The Malay States are developing so rapidly and so much forest land is being diverted to other purposes that it is difficult to make a definite forecast. It is stated, however, that the outlook calls for the exercise of great care.

Attention has been drawn in the Proceedings of the Conference to the serious position in Sierre Leone.

C. Steps which should be taken to protect and develop the forestry resources of the country.

A number of the Statements indicate the necessity (which has been made abundantly clear in the Proceedings of the Conference and the Resolutions) of a better appreciation of the value of forests on the part of Governments and peoples, and the desirability of having a settled forest policy and an efficient forest service. Hand in hand with an enlightened attitude towards the forests go forestry education, experiment and research.

Among the technical problems fire protection and regeneration are ever present. Wasteful utilisation is also a matter requiring early attention.

Some of the more urgent problems of the individual parts of the country are stated below.

For the United Kingdom it is urgent to get replanted the areas felled during the war, to extend the area under timber by afforesting a proportion of the 4,000,000 acres of uncultivated land suitable for the purpose, and to increase the production from the existing woodland area.

In British India there are required concentration on the more favourably situated areas with a view to increasing the yield, co-operation between the Forest Department and the commercial world, and co-ordination of the various branches of the Department's activities.

For Canada fire protection is the most pressing problem, but insect and fungus diseases and careless utilisation also require attention as well as regulation of the cut and of cutting in such a way as to secure efficient natural regeneration. These are, perhaps, problems which will find their solutions best in a more extended policy of constituting and managing forest reserves as permanent State forests.

In Australia generally the dedication of further large areas to forestry is necessary, the regulation of utilisation to correspond with increment, less wasteful utilisation and efficient fire protection, and the planting of conifers to meet the deficiency in the local soft-wood supply.

In New Zealand and Newfoundland (though this is not put forward in the Statements) it appears that the most urgent step is to settle upon a definite forest policy. Fire protection is an important matter in Newfoundland.

As regards South Africa the future appears to lie with the extension of plantations. The silvicultural requirements of the indigenous species require careful study and on the utilisation side better transport facilities and less wasteful methods are to be desired.

In Nigeria the system of shifting cultivation employed by the natives is destroying large areas of forest and should be curtailed. It is stated for the Gold Coast that 14,000 square miles of forest should be reserved as a step towards conservative management.

It is essential in Southern Rhodesia to change the existing wasteful methods of utilisation and to curtail the heavy drain on forests. State forest reserves should be created.

In British East Africa and the African Colonies generally there is urgent need for research on forest products and into silviculture, and for the exploration, demarcation and dedication of forest reserves.

In the Malay States the area of forest reserves should be widely extended and properly distributed having regard to the development of the country. Even so there is need for economy and reduction in consumption.

The requirements of Cyprus are stated to be the abolition of goats and the prohibition of grazing, fire protection and the re-afforestation of waste areas.

In British Guiana investigation into natural regeneration, closer utilisation, fire protection, development of transport facilities and research into forest products are all required. The existing forestry staff is quite inadequate.

In conclusion it may perhaps be permitted to quote from one of the most slender of the Statements presented to the Conference. "The Committee desires to point out that the reason why Wei-hai-wei and its resources have remained undeveloped is due to the uncertainty and insecurity which have always existed It has become abundantly clear in making the above Summary that of all undertakings forestry is that in which uncertainty and insecurity (whether of policy, organisation or technical procedure) are least likely to secure satisfactory results. It is only fair to add that this fact appears to be gradually gaining appreciation throughout the British Empire.

ADDRESS TO HIS MAJESTY THE KING.

MAY IT PLEASE YOUR MAJESTY :—

We, the delegates to the British Empire Forestry Conference from the United Kingdom, the British Dominions beyond the seas, and the Empire of India have the honour to present to your Majesty this humble address.

We value very highly your Majesty's gracious permission to be present here to-day, both because it enables us to submit this expression of our loyalty to your Majesty's Person and Throne and also as a recognition of the important position occupied by forestry in the resources of the Empire.

We desire to express our devoted loyalty to your Majesty in whom we recognise not only our King and Emperor, but a brother forester who both in his care for silviculture, and in his willingness to sacrifice the best of His timber in the great emergency through which the Empire has passed has set the best example to all who own or have charge of land.

In forestry work, as in other matters, the war has brought the different parts of your Empire more closely together, and has also shown the desirability of taking mutual counsel for the development of Imperial resources.

Thus, as a result of the heavy demands for timber for war purposes in France and Flanders, accompanied as they were by unexampled difficulties of transport, forestry corps were assembled from Canada and from many other parts of the Empire which did work of the greatest value both in this Country and in France in the rapid conversion of British and French forests to war uses. The same causes led to the formation in this Country of a Forestry Commission charged with the duty of developing forestry in the United Kingdom. This Commission has felt it a primary duty both to bring to its aid the riper experience of the forestry services of India and the Dominions and to assemble representatives of the forest services of the Empire for mutual consultation and assistance.

The Governments of the Empire have responded to the invitation from the Mother Country by appointing delegates and by causing to be prepared statements upon which we have based our deliberations describing their timber resources and the methods adopted for their conservation, and utilisation, and giving estimates of production and consumption which will be a guide to future policy.

Upon the assembling of the appointed delegates we were fortunate in being able to visit the Empire Timber Exhibition, and so to strengthen our conviction of the great importance of timber and timber products in almost every part of our industrial and domestic life, and of the great possibilities of extending their use to the advantage of the Empire both in wealth and strength. We believe that this Exhibition has greatly assisted Your Majesty's subjects to realise the supreme importance of a steady increase in the production of timber from all parts of the Empire, sufficient in quantity and quality to meet the evergrowing needs of the world.

We have had the advantage during our deliberations of visiting different parts of the Kingdom, including the Crown Woods of the Forest of Dean and Tintern, and we look forward during the remaining days of the Conference to seeing the Windsor Woods and Windsor Castle which Your Majesty has kindly allowed us to visit.

Our work is still continuing and we cannot yet foresee its full effects. We trust, however, that there may result from it the setting up of an Imperial Forestry Bureau which may act as a centre of information with regard to all Imperial Forestry problems, to which forest officers and foresters from all parts of the Empire may look for any assistance which they may desire to obtain.

Of one thing we have had abundant proof—that in forestry matters the different parts of the Empire in spite of differences of situation, resources and experience, have much to learn from and to teach one another. We trust that it may be found that this spirit of friendly co-operation which our Conference has evoked, inspired as it is by loyalty and devotion to Your Majesty's service, may inure to the advantage of Your Empire for many generations to come.

HIS MAJESTY'S REPLY.

It gives me much pleasure to welcome you here to-day, and I appreciate your reference to me as a brother forester. Both my father and Queen Victoria took a keen personal interest in forestry, and I am glad to think that, partly owing to that interest, the Crown woods were able to make some contribution towards the needs of our armies in France and Flanders. I extend a special welcome to those of you who have travelled far from overseas to take part in the Conference. During the War I came into contact with many of the foresters from overseas, including the Canadian Forestry Corps who were working in my Windsor woods, and I know how valuable were the services they rendered.

I congratulate the Forest Authority of the Home Country that it has been able thus early to join hands with foresters in other parts of my Empire.

The work of the Universities and Colleges, and the experience gained in the Crown woods and private plantations, have laid a foundation upon which it is incumbent upon us to build: and it is satisfactory to find that India and the Dominions, where forest science and administration already form part of the national life, are willing to place their experience at our disposal. Their help will be most valuable to those parts of the Empire to which the importance of the subject has for the first time been seriously brought home by the experience of the War.

It is a peculiar difficulty of your work that it demands perhaps more imagination, more patience and more foresight than any other industry, and it is an immense advantage that the experience of all parts of the Empire should be brought into a common stock and made available for all.

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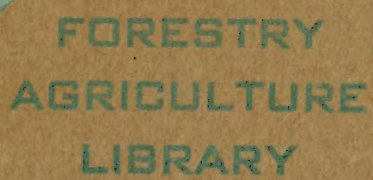
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